USER MANUAL

Tobii Studio™ 1.2

PDF Draft version 1.0

Tobii Support

Support Phone Sweden: +46 8 6636003
Support Phone USA: +1 703 738 1321
Email: support@tobii.com
Web: www.tobii.com

Tobii Studio 1.2 User Manual

Please note that this document is under development. Please check the Tobii website www.tobii.com for updated versions of this manual.

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1. Introduction

Tobii Studio and the Tobii Eye Trackers can be used to analyze many different things in different scenarios. Different study setup examples can be found in the system recommendations for the eye tracker used. The different setups or connection alternatives for the TX-series eye trackers can be found in the guide sent with the eye tracker. The Tobii Studio analysis software is an application designed to provide easy-to-use yet flexible and powerful recording and analysis of eye tracking data.

The package facilitates efficient multi-person and multi-trial studies in the fields of experimental psychology, commercial usability, advertising, low-vision studies and more. To facilitate meaningful studies, the software combines the collection and analysis of eye gaze data with numerous other data sources, including keystrokes, external devices, video recordings, web browser activities and more.

Installation instructions can be found on the CD and in the chapter installation.

A valid license key is needed to run Tobii Studio. The license can be found on the Tobii Studio CD cover. It can also be obtained from Tobii by contacting support.

An online help can be opened by clicking the question mark in the different views in Tobii Studio. The help page for that specific part of the software will appear. The online help can also be reached from the Help menu.

2. Application areas

With its intuitive workflow and powerful tools, Tobii Studio is the optimal tool for gathering data from a large number of test participants cost-efficiently. Extensive data is effortlessly taken to a high level for in-depth analysis, providing an invaluable understanding of individual user behavior and statistical results from several users.

The intuitive workflow of Tobii Studio enables practitioners, researchers, and students to work with the system without extensive training or the participation of experts.

Usability studies

Tobii Studio is very well suited for evaluating user experience in regard to:

- Websites
- Software
- Computer games
- Interactive TV
- Handheld devices
- Other physical products

Advertising testing

Tobii Studio is ideal for testing advertising design on a variety of media:

- Packaging and shopping shelf design and placement
- Web advertising
- TV commercials
- Print advertising, digitally scanned and presented on a monitor.
- Print advertising, using the actual physical print.

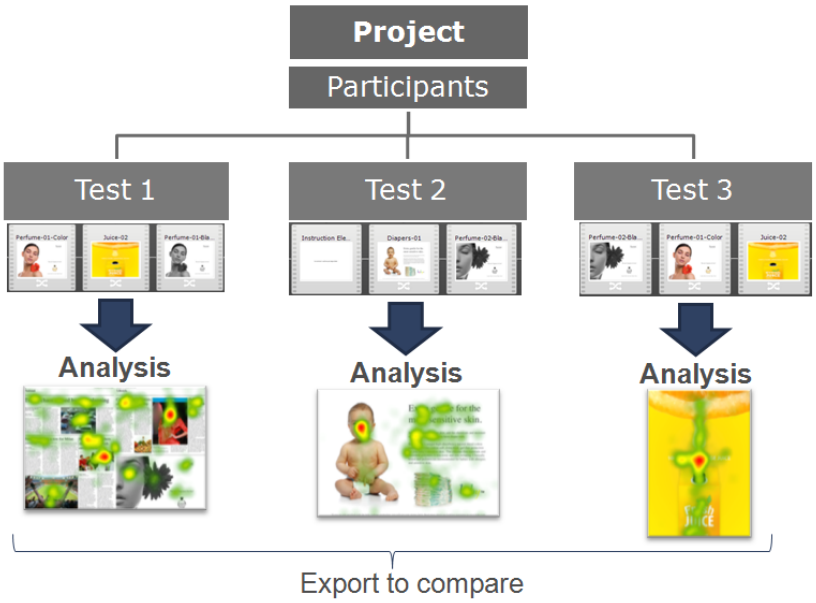
Psychology & Physiology Research

Tobii Studio is suitable for a wide range of psychology and physiological experiments, such as:

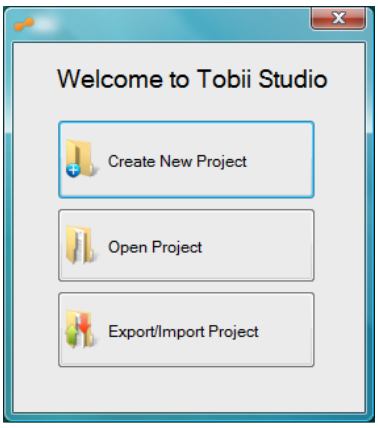
- Infant Research
- General psychological response studies, including the use of scan-paths, gaze distribution, gaze response times, and manual response times
- Studies of autism, ADHD, and schizophrenia
- Reading studies
- Studies of ocular-motor behavior and vision deficiencies

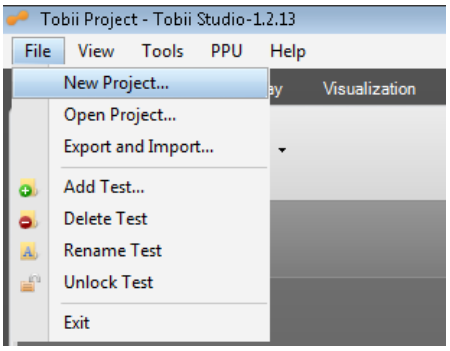
3. Create a new project

A project in Tobii Studio can contain several tests, every test has a separate timeline and separate results, the participants in a project are shared between the different tests.



Create a new project by clicking **Create New Project** or select **File -> New Project...** Enter the name of the project and click Create.





Enter the name of the first test to be included in your study and click OK.

A project can also be created or opened from the File menu in Tobii Studio.

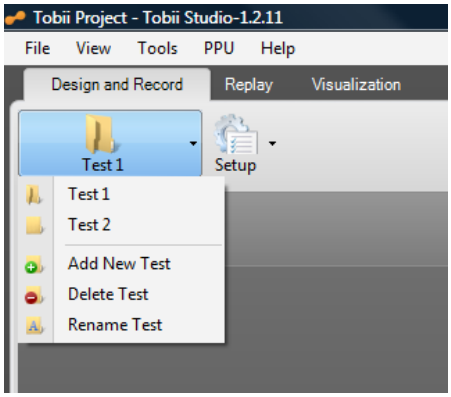
4. Design and Record

In the Design and Record view, stimuli are selected by adding media to a timeline and recordings started by pressing a button.

4.1 Design

Select or create a test

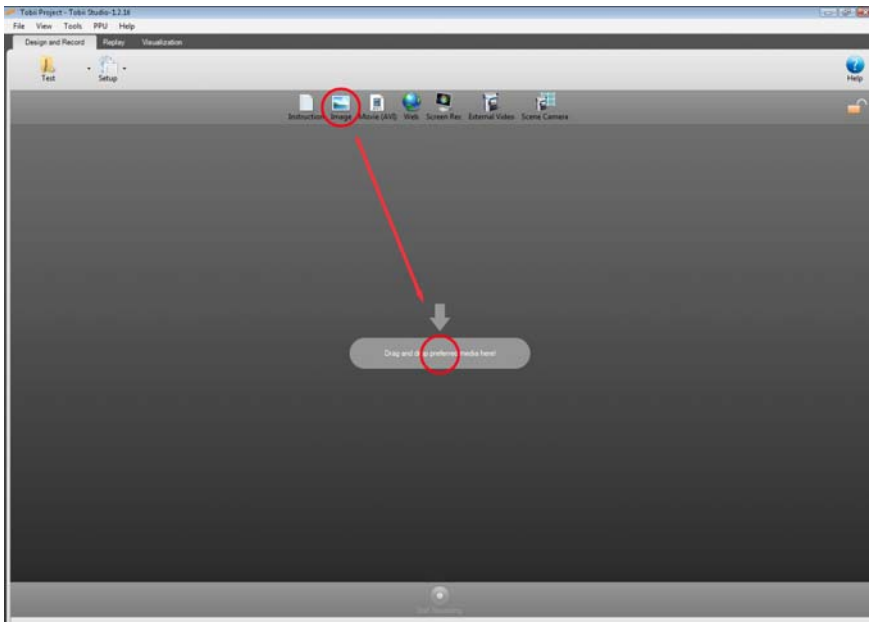
The Test List shows a list with all test setups in the study. Click on the test you want to view or edit. Add a test by clicking Add New Test, enter a name in the window appearing and click create. The test can also be renamed under the Test tab.



Next step is to add media to the test, see next chapter.

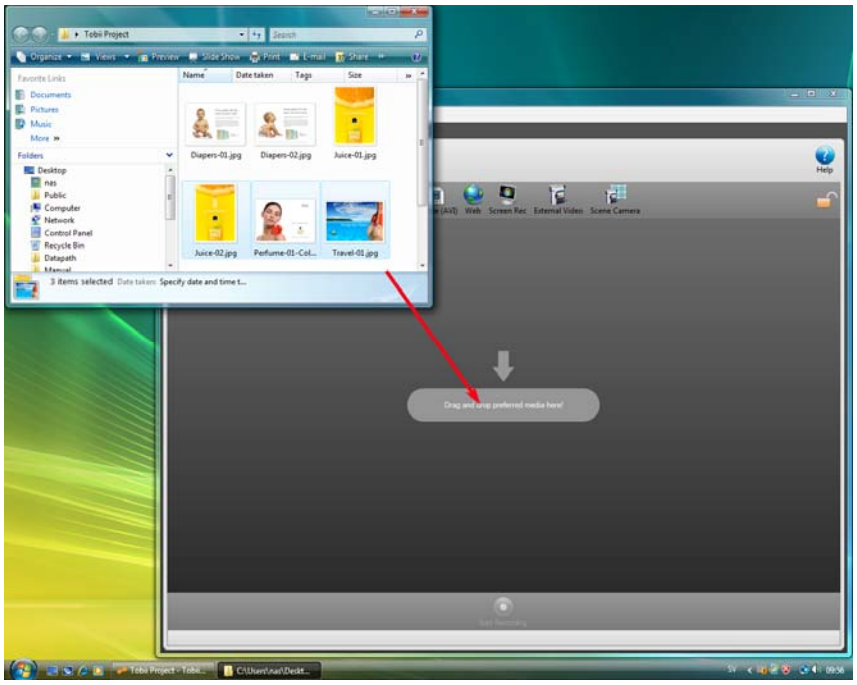
4.1.1 Adding Media

The media can be added to the test by dragging-and-dropping the media icon from the toolbar to the timeline. Different kinds of media can be mixed on the timeline.

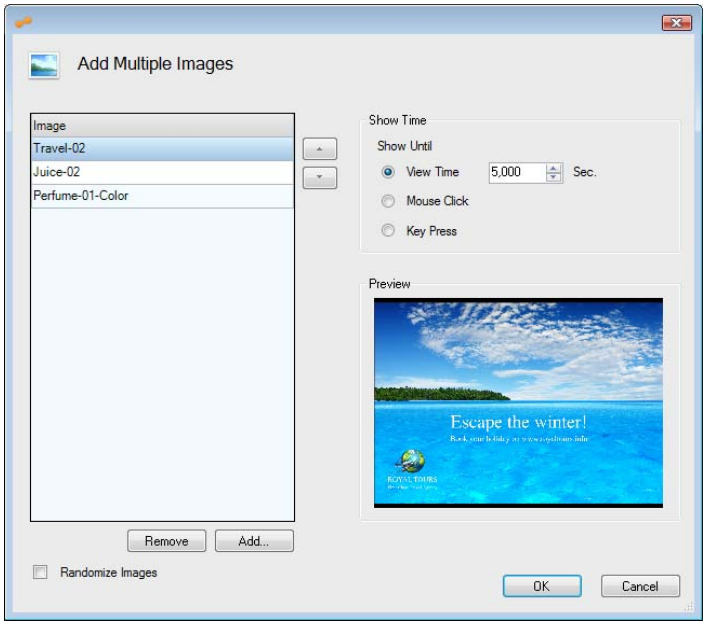


Adding Multiple Images

Multiple images or movies can be added from Explorer using drag-and-drop. Open the folder containing the images and mark all images that are to be added to the study. Use drag-and-drop to add them to the Design and Record view in Tobii Studio.

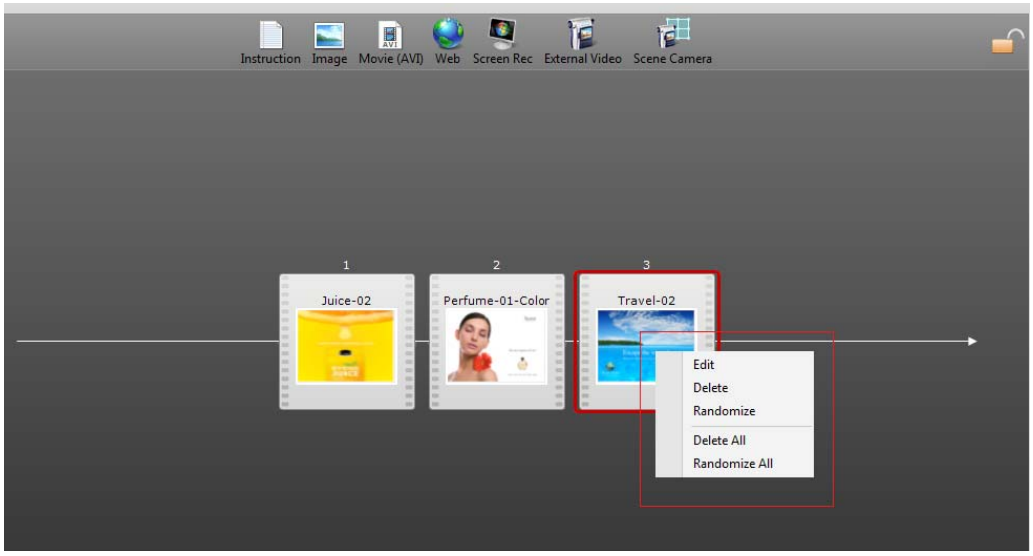


Select show time option for the images or movies. Read more about the options under images or movies. To show the images in random order, check the box, "Randomize Images".

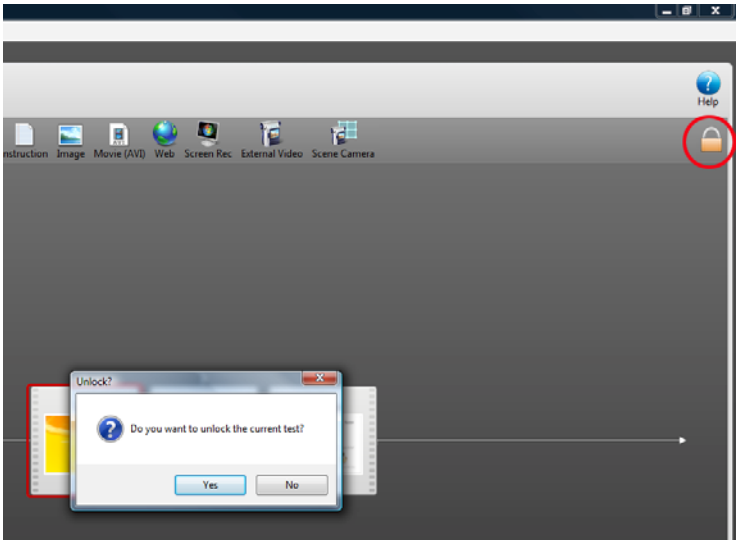


Edit Media

Highlight and right-click on a media to edit or delete it. In the edit view, the media name, media path and view time option can be changed.



The test will be locked once recordings have been made in the test. In this case the test has to be unlocked before the media can be edited. This is done by clicking the lock symbol in the Design and Record view according to the image below.



Randomize Order

Highlight, right-click on a media and select randomize to set the media to be shown in random order.

4.1.2 Media and stimuli types

Different kind of Media can be analyzed using Tobii Studio. The Media shown in this analysis software is sometimes also referred to as stimuli.

The media types that can be analyzed using Tobii Studio are:

- ***Instructions:*** They are shown as a text on an optional background image can be added to the study.
- ***Images:*** Any picture format can be used. The image will be shown in actual size. Check the image size and screen resolution to make sure the image is shown correctly.
- ***Movies:*** Movies have to be in AVI format. Make sure the AVI image size is the same as the resolution being used during recordings if the AVI is to be shown in full screen mode. Also check that required video codecs are installed on the computer.
- ***Web:*** Web pages can be analyzed. Simply enter the URL, web address, for the website. It is only possible to use Internet Explorer for web studies.
- ***Screen Recording:*** This media type is used when analyzing software or just about anything shown on the computer screen.
- ***Scene Camera:*** A camera can be used to analyze how people watch physical objects. It can also be used to film whiteboards, etc., watched by the test participant.
- ***External Video:*** This option is used to analyze software, games, a program running on a different computer, TV, etc.

Instructions

Instructions such as a task for a web page or which button to press to see the next image can be added to the timeline. An instruction can be placed at the beginning or between other media elements on the timeline.

The instruction is shown as a text on optional background.

Element Name

An optional name can be typed on the line under Element Name.

Preview

Add the instruction in the Preview text field. The text font can be changed by clicking the *Font...* button and the color of the text can be selected in the drop-down menu.

A color or optional image can be selected as a background. Select by clicking the *Color* or *Image* check box. Color is selected from the drop-down menu and the image is selected by browsing the computer.

The small window to the right under the Preview section shows what the instruction will look like. Note that the instruction will be in full screen mode during the recording and that this window only shows a preview.

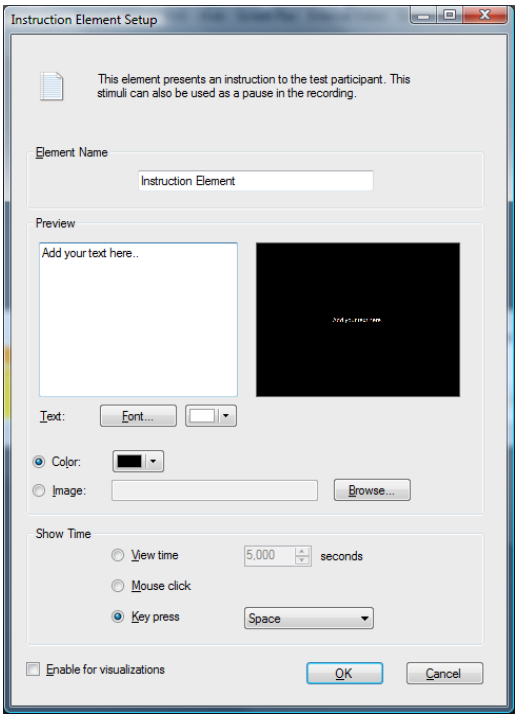
Show time

- *View time:* a view time can be selected by pressing the up and down arrows or typing a time. When the view time is up, the next media on the timeline will be shown.
- *Mouse click:* the instructions will be shown until someone clicks the mouse. This can be done by the test participant or the test leader. Thereafter the next media on the timeline will be shown.

- *Key press:* the instructions will be shown until any key on the keyboard is pressed. This can be done by the test participant or the test leader. Thereafter the next media on the timeline will be shown.

Enable for Visualizations

This makes it possible to select whether heat maps, gaze plots, etc., are to be created for the instructions. Saving them for visualizations will make the project larger. For ForSight customers, the stimulus will be regarded as an image stimulus for the media in the visualization.



Image

Element Name

A name will be suggested by the software. If you want to change the name simply click on the name line and enter a new name. The name chosen here will be the name shown in all the visualization tools such as the hot spot and the statistics.

Image Source and Size

Browse to find the image that should be included in the test.

Make sure the image is the size it should be when being shown in the test. Images shown in Tobii Studio during recording will be actual size. Tobii Studio will not resize images, but they will have to be resized to be shown on optional parts of the screen. To view the image in full screen mode the image has to have the same size as the screen, which is the screen resolution. Read more in the chapter computer settings.

Resize Image

An optional image editor can be used to resize images. Common programs in XP are Microsoft Office Picture Manager and Microsoft Photo Editor. *Microsoft Office Picture*

Manager is found under *Windows Start* **->** *All Programs* **->** *Microsoft Office Tools.* To resize, go to image object and select resize. Go to File and save the image. The new resized image can now be used in Tobii Studio.

Microsoft Photo Editor is found under *Windows Start* **->** *All Programs* **->** *Microsoft Office Tools* **->**. To resize the image go to the Image menu and select Resize.

More recommendations on image editors can be found in the system recommendations.

Use as Dummy Media

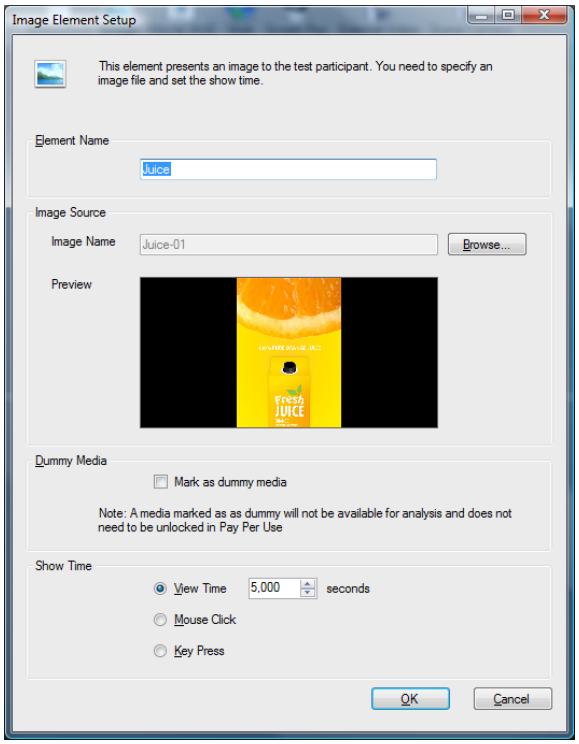
This option is developed for ForSight Customers. It can be used when images are shown in a test but where data should be obtained for only one or a few.

If the box, use as Dummy Media, is checked, no visualization data will be available for the image. ForSight Customers are not charged for images marked as Dummy Media.

The image will be shown on the eye tracker screen during recording but it will not be possible to get a gaze plot, hot spot, etc., for the image.

Show Time

- ***View time:*** A view time can be chosen by pressing the up and down arrows or typing a time. When the view time is up, the next media on the timeline will be shown.
- ***Mouse click:*** The image will be shown until someone clicks the mouse. This can be done by the test participant or the test leader. Thereafter the next media on the timeline will be shown.
- ***Key press:*** The image will be shown until any key on the keyboard is pressed. This can be done by the test participant or the test leader. Thereafter the next media on the timeline will be shown.



Movie – AVI

Element Name

A name will be suggested by the software. If you want to change the name, simply click on the name line and enter a new name. The name chosen here will be the name shown in all the visualization tools such as the hot spot and statistics.

Movie Source

Browse to find the movie that should be included in the test. Make sure the video is the size it should be when being shown in the test. Tobii Studio will not resize the video. If the movie shall cover the full screen make sure it is the same size as the screen resolution. Also make sure to use a video codec supported by Tobii Studio. More information about screen resolution is found in the chapter computer settings.

Movies added to a test in Tobii Studio have to be in AVI format. The AVI contains video and audio which can be encoded with different codecs. Make sure the codecs selected are installed on the computer where the tests are run in Tobii Studio. Microsoft Video 1, Techsmith and MP3 are installed on all Microsoft computers. Other codecs have to be installed by the user. Information on other codecs can be found in our system recommendations.

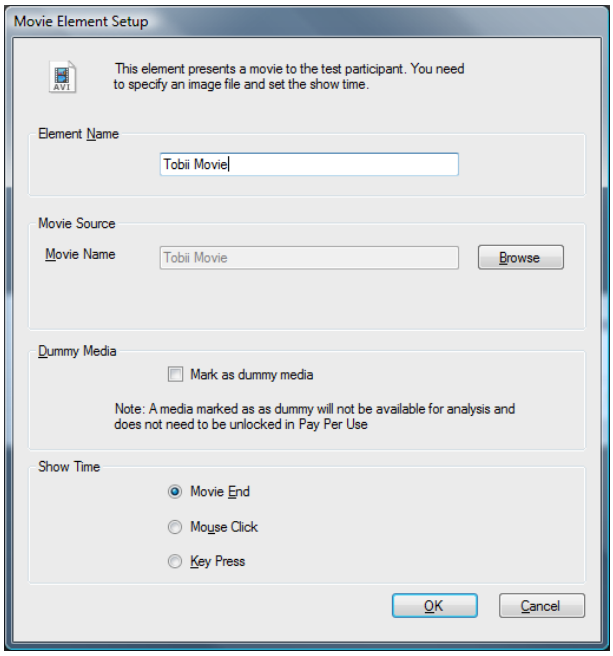
Dummy Media

If set to dummy media, the movie will be shown during the recordings but will not be available for analysis in the visualization view. ForSight Customers are not charged for movies marked as Dummy Media.

Show Time

There are different options for ending the viewing of an AVI. After the movie has ended, the next media on the timeline will be shown. If the movie is the last media on the timeline the recording will end.

- ***Movie End:*** The movie will be shown and gaze data recorded until the movie ends.
- ***Mouse Click:*** Movies can be ended by clicking the mouse
- ***Key Press:*** Movies can *be ended by* pressing any key on the keyboard if this option is checked.


Movie Element Setup
This element presents a movie to the test participant. You need to specify an image file and set the show time.
Element Name
Tobii Movie
Movie Source
Movie Name
Tobii Movie
Browse
Dummy Media
Mark as dummy media
Note: A media marked as as dummy will not be available for analysis and does not need to be unlocked in Pay Per Use
Show Time
Movie End
Mouse Click
Key Press
OK
Cancel

Web

All web pages will automatically be opened in Internet Explorer. It is currently only possible to use Internet Explorer for web studies when using the web stimulus in Tobii Studio.

Element Name

A name will be suggested by the software. If you want to change the name simply click on the name line and enter a new name.

Start URL

Sets the address of the web page your recording will start from. There is no need to specify http://

Stop recording of web

To stop the recording and to close the web browser press **F10**. The next media on the timeline will be shown when stopping the recording of the web page. If the web page was the last media on the timeline in the test the recording will be ended.

Allow multiple windows

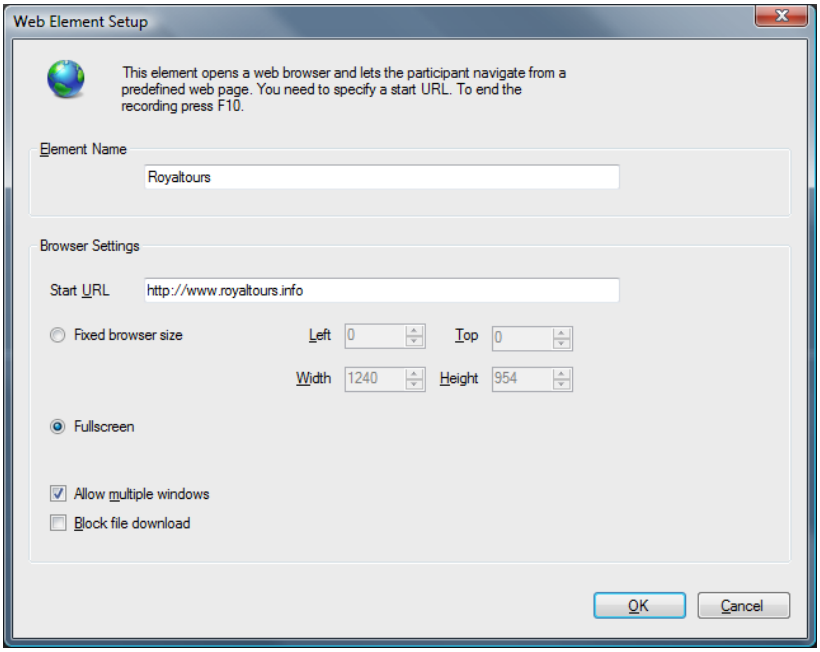
More than one browser window may be opened during recording. Only the gaze data and screen information for the active browser window will be recorded.

Block file download

This blocks the browser from starting download of files to the hard disk if the user clicks a download link.

Browser size

A fixed browser size can be defined with height and width of the browser window as well as location on the screen. Note: This is the origin and size of the whole browser window not the origin and size of the internal window showing the web page. When the option Fullscreen is selected the browser will open up in full screen size at the start of the recording.



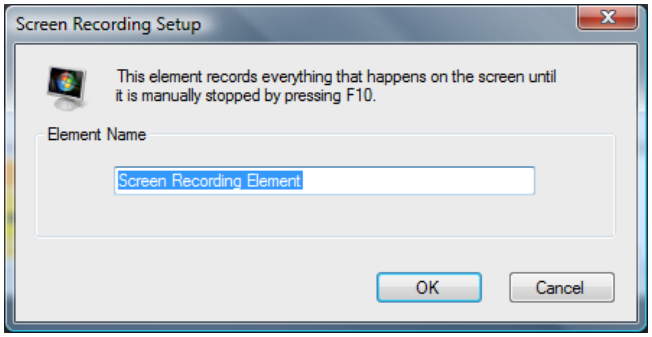
Screen recording

Screen Recording is used to record a video of what happens on a screen during gaze recording. This may be used to achieve a good understanding of gaze behavior while using different types of software on a computer.

The screen recording is intended for recording low-intensity graphics such as when the subject is using software such as a word processor, PowerPoint, etc. For highly graphics-intensive applications such as replaying a full quality movie or playing a computer game, the AVI media or the External video media are recommended instead.

Preparing the screen recording

Drag the screen recording media icon to the timeline, give the media element a name and click OK. Recordings can now be started. If specific software is to be analyzed, it can be good to have this opened in the background before starting a recording. To stop the recording press **F10**.


Screen Recording Setup
This element records everything that happens on the screen until it is manually stopped by pressing F10.
Element Name
Screen Recording Element
OK
Cancel

Data recorded

At the start of the recording, the Tobii Studio application is hidden and whatever is present on the computer desktop is shown. The subject is free to use any type of application on the computer. Eye gaze data is recorded, as well as a movie of the screen contents. Keystrokes and mouse clicks are also recorded and saved as events.

The screen recording video is recorded at full screen resolution.

Scene Camera

The scene camera media are intended to be used in combination with the X50 or X120 eye-tracker hardware when video data is collected from a physical scene using a stand-alone camera. This media type is very similar to the external video media, with the addition that it also performs a point-of-view compensation to compensate for the fact that the scene camera is placed at a certain angle relative to the stimuli and the user.

Setup

The scene camera is used for different kinds of setups. See examples under X120 setups and X50 setups in the system recommendations.

Please make sure the eye tracker is properly setup and that the correct parameters, like distances and angles, have been added in the X120 or the X50 configuration tool before you do the scene camera setup in Tobii Studio.

A typical scene camera setup will contain the following key items:

- Some sort of stimulus presented in the physical world. This can, for example, be a collection of objects that are moved around on a table. For proper gaze recording, the stimuli should be positioned in a 2-dimensional plane to the greatest extent possible. Any deviations from the plane (for example, caused by the height of objects placed in the plane) will cause parallax errors in the gaze estimation.
- A “calibration grid” which is placed on the surface that is being tracked is used for individual calibrations and to align the point-of-view calibration.
- A scene camera, which is used to generate a video of the scene presented to the test subject. The video from the scene camera will be recorded in Tobii Studio.
- A Tobii X50 or X120 eye tracker and the correct settings in the configuration tool.
- Computer with the Tobii Studio software.

Preparing the scene camera

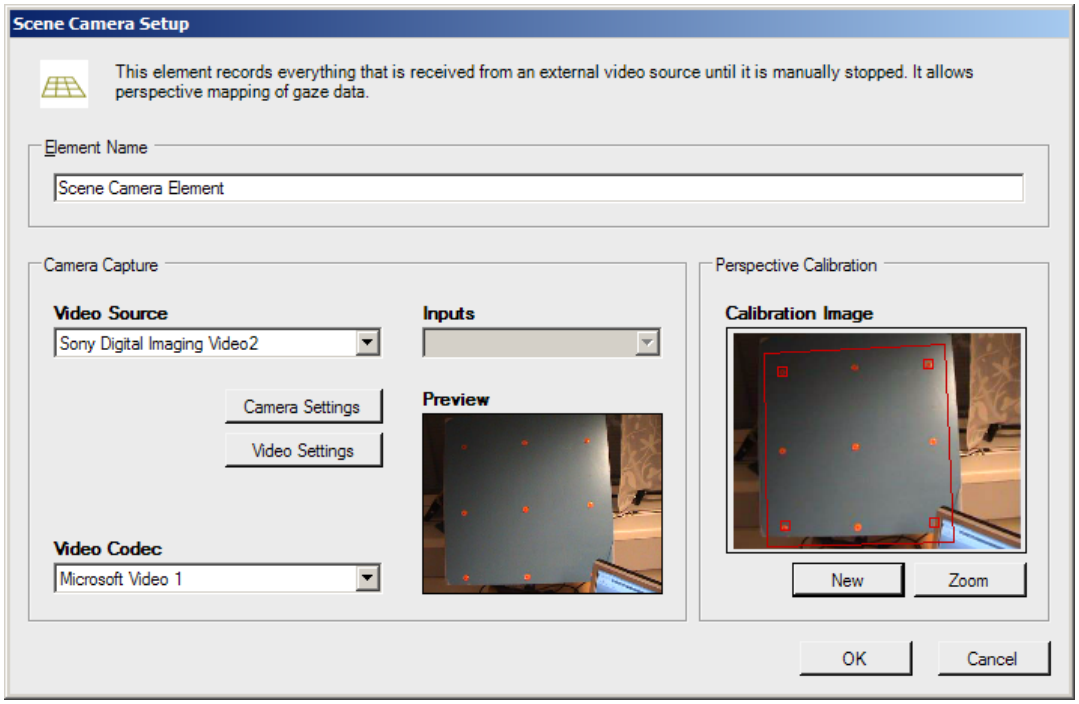
To prepare the scene camera capture, make sure the hardware is setup properly. The video source needs to be connected to a video capture card or FireWire or USB port of the computer where Tobii Studio is running. Please refer to the System Recommendations or contact Tobii support for information on recommended video capture cards and setups.

Settings

In the prepare view for Scene Camera, there are a number of settings describing video source and intended capture results.

- ***Video Source*:** This will define the video device used – video camera, video capture card, input via USB, etc.
- ***Video Inputs*:** This needs to match the type of video source used. Most video capture cards have the option of capturing at least S-Video and Composite.
- ***Camera Settings*:** These are the settings of the currently installed camera and typically include brightness, contrast, etc.
- ***Video Settings*:** These are also hardware specific settings, which typically include size and frame rate for the video captured.
- ***Video Codec:*** This defines the compressor to use to create the video recording. The choice of compressor will impact the video quality, the video file size, the CPU load during recording, portability, etc. For most purposes the Microsoft Video 1 compressor is recommended.

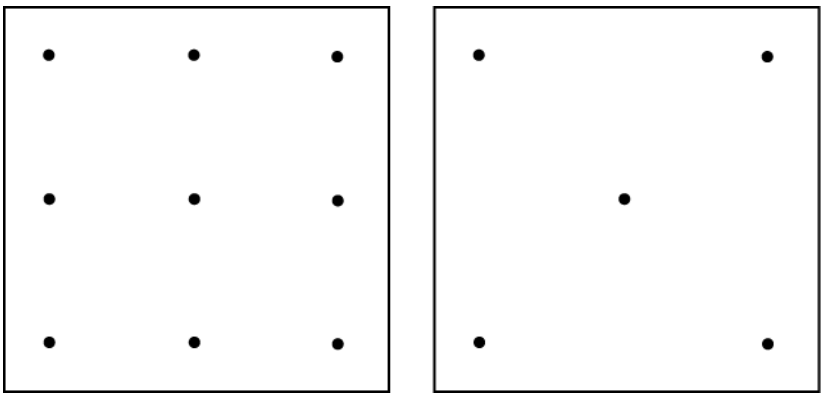
For more recommendations on codecs, cameras and cards see the system recommendations.



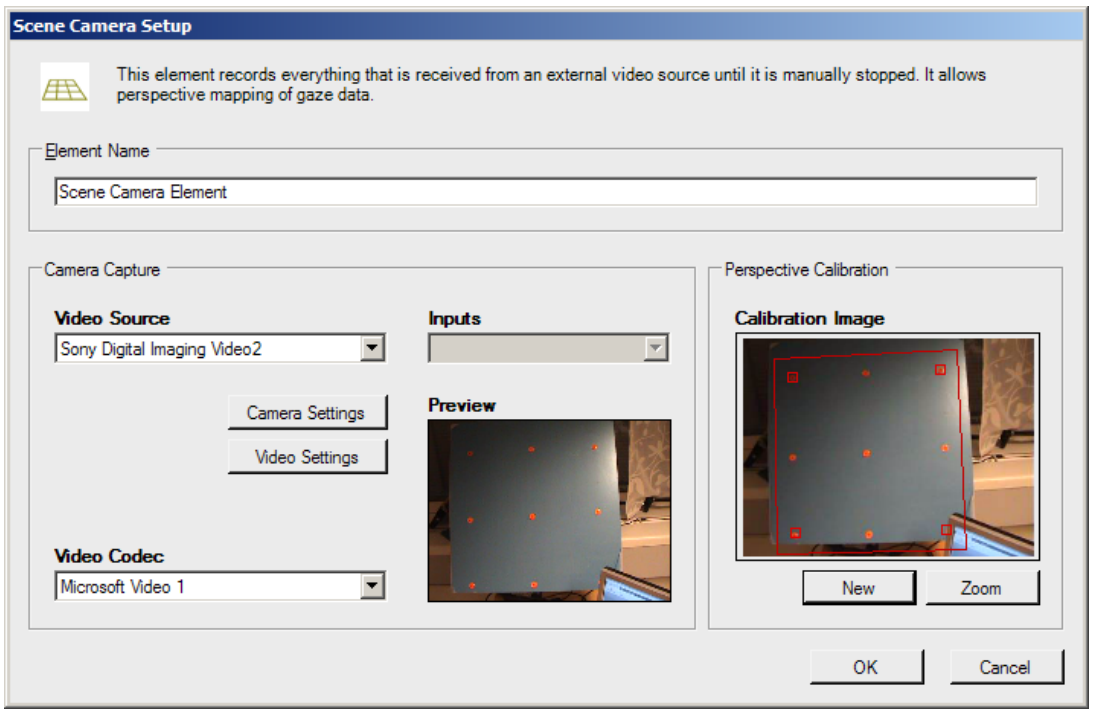
Calibration Setup

After specifying the video capture settings, a perspective calibration has to be made in order to correlate the captured video to the physical world. In order to define how this calibration grid is positioned relative to the scene camera, a perspective calibration is required. This allows Tobii Studio to recalculate all gaze data to accurately indicate where on the presented scene the subject has been looking.

To perform the perspective calibration, place the calibration grid on the surface to be tracked. Instead of using the calibration board, calibration dots can be drawn on a paper or be shown on a white screen. Below is an example of a calibration grid for a 9-point calibration and for a 5-point calibration.



Adjust the settings for the video characteristics as described above. Use the preview panel to adjust the scene camera so that it captures the area on which eye tracking is to be conducted. Fixate the camera so that it cannot accidentally be moved and click the New button in the *Calibration Image* section of the Scene Camera Setup.



The scene camera now shows an image of the scene, with a polygon drawn on top. Adjust the polygon by dragging the four squares in the polygon so that these are precisely on the corner calibration points. To make sure it is set properly you can enlarge the calibration image by pressing the zoom button. See more about how to set up the hardware and calibration board in the document, *How to set up the Tobii x50* or *the X120 Manual or Quick Start Guide.*

Performing Calibration

When calibrating a test subject for a real world setting with physical objects it is advisable to use the manual calibration in Tobii Studio. The manual calibration settings are found under *Tools -> Settings -> Calibration.* Read more about how to perform a manual calibration in the Calibration chapter.

Data recorded

During recording, Tobii Studio will record a complete video of the input from the scene camera. Gaze data, as well as keystrokes and mouse clicks will also be recorded. Gaze coordinates are in the calibration grid and range from (0.0) to the resolution of the scene camera movie.

Important notes - Minimizing parallax errors

The perspective calibration is intended to compensate for the difference in angle from the calibration grid and the scene camera.

However, this only compensates for angles as seen in the stimulus plane. If three-dimensional physical objects are used as stimuli and these have a certain height that takes them far away from the stimulus plane, this will cause a parallax error. The size of this error is related to the difference in point of view from the scene camera and the test subject.

Therefore, to minimize parallax errors, it is recommended that you place the scene camera at an angle fairly close to that of the test subject, for example, slightly behind and to the side of the subject or immediately over the subject's head.

External Video

External video capture media is intended to be used when the video data comes from a source other than the Tobii Studio computer. Tobii Studio records a video input from most video sources such as a movie, which can later be used for gaze analysis in Tobii Studio.

This media type is recommended when presenting stimuli with software other than Tobii Studio or when doing eye tracking on other dynamic stimuli generated outside Tobii Studio such as console games, interactive television or resource-intensive computer games played on another computer.

Video Source

Different video sources are used depending on what is to be captured. Examples of sources are listed here:

- Video capture cards for VCR input
- VGA capture cards for input from another computer
- VGA to USB converter to capture VGA signal from another computer via USB
- Digital Camera via FireWire (T/X-series)
- Video or web camera via USB streaming

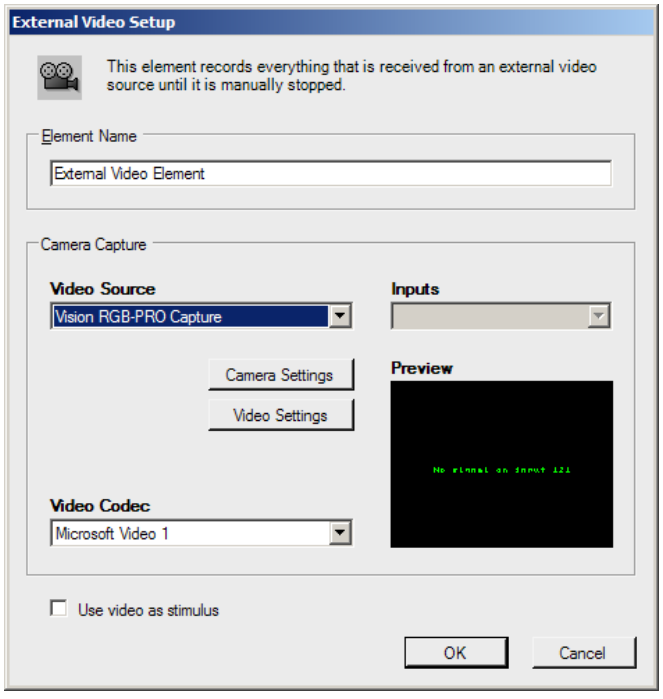
Preparing the external video capture

To prepare the external video capture make sure the hardware is set up properly. The video source needs to be connected to a video capture card, FireWire or USB port of the computer where Tobii Studio is running. Please refer to the System Recommendations or contact Tobii support for information on recommended video capture cards and setups.

Settings

In the setup view for External video capture, a number of settings defining the video to be captured can be defined

- ***Video Source:*** This will define the video device used – video camera, video capture card, input via USB, etc.
- ***Video Inputs:*** This needs to match the type of video source used. Most video capture cards have the option of capturing at least S-Video and Composite.
- ***Video Codec:*** This defines the compressor to be used to create the video recording. The choice of compressor will impact the video quality, the video file size, the CPU load during recording, portability, etc. For most purposes, the Microsoft Video 1 compressor is recommended.
- ***Camera Settings:*** These are the settings of the currently installed camera and typically include brightness, contrast, etc.
- ***Video Settings:*** These are also hardware-specific settings, which typically include size and frame rate for the video captured.
- ***Use video as stimulus:*** When this option is checked Tobii Studio will display the video input on the subject screen during recording.



Data recorded

During recording, Tobii Studio will record a complete video of the input from the video source. Gaze data, as well as keystrokes and mouse clicks will also be recorded.

Notes

When performing video capture, the video signal needs to be converted from an analog to a digital signal in most cases. Thereafter, it needs to be captured and compressed into a movie. Because of this, delays are induced that affect the precision in timing of the video. Also, at high CPU load, some video capture devices lose video frames occasionally. This means that although gaze data and trigger data is timed with the same precision as for all other Tobii Studio media types, the synchronization of gaze data in relation to the captured video may be degraded. Make sure to use a high performance computer.

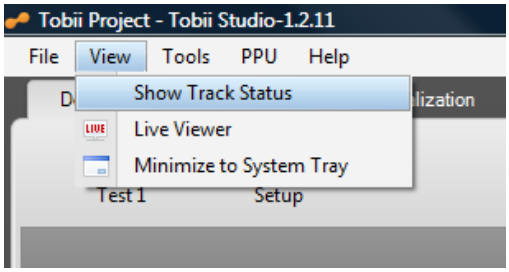
Recommended computers, video capture cards and codecs can be found in the system recommendations.

4.2 Calibration

The calibration “teaches” the eye tracker the characteristics of a particular subject’s eyes. This is necessary for accurate estimation of a subject’s gaze point.

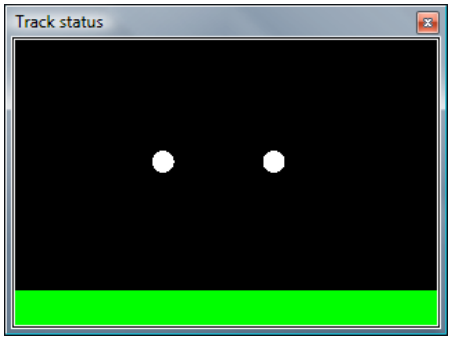
4.2.1 Track Status

The track status meter is shown before each calibration and can also be displayed in the Live Viewer. It can also be activated directly from the View menu.



The purpose of the track status meter is to verify that the test subject is in the correct position in front of the eye tracker, and that the system is able to properly track the subject.

The track status meter shows a black box with two white circles and a status bar at the bottom. The black box represents the field of view of the eye tracking camera and the white dots represent the eyes of the test subject. As long as at least one of the subject’s eyes is within the box, the system can track eye movements.



For best results, both eyes should be in the middle of the box as shown in the picture above. It is also recommended to start each recording session by having the subject's eyes placed in the middle of the track status meter at a distance of about 60 cm for the 1750/X50 or at a distance of 70 cm for the T60/T120/X120. This enables the subject to move as much as possible during the test without moving outside the box. The colored status bar indicates the tracking ability. If the bar is colored green and is not flickering, the system is tracking the test subject well. If the status bar is red or flickering between red, yellow and green, the system has difficulties tracking the particular subject for some reason. In most cases, this means that tracking will not be successful, even though it is possible to try by continuing with calibration and recording

4.2.2 Calibration Options

The default calibration in Tobii Studio consists of five dots shown on the screen during the calibration procedure.

The calibration settings are found under *Tools -> Settings -> Calibration*

Regular calibration

In the regular calibration, 5 dots are shown as a default. It is possible to change the number of calibration dots as well as the color of the dots and the background in the calibration setup.

Calibration Settings

Set the number of calibration points that are to be shown during calibration by checking one of the alternatives.

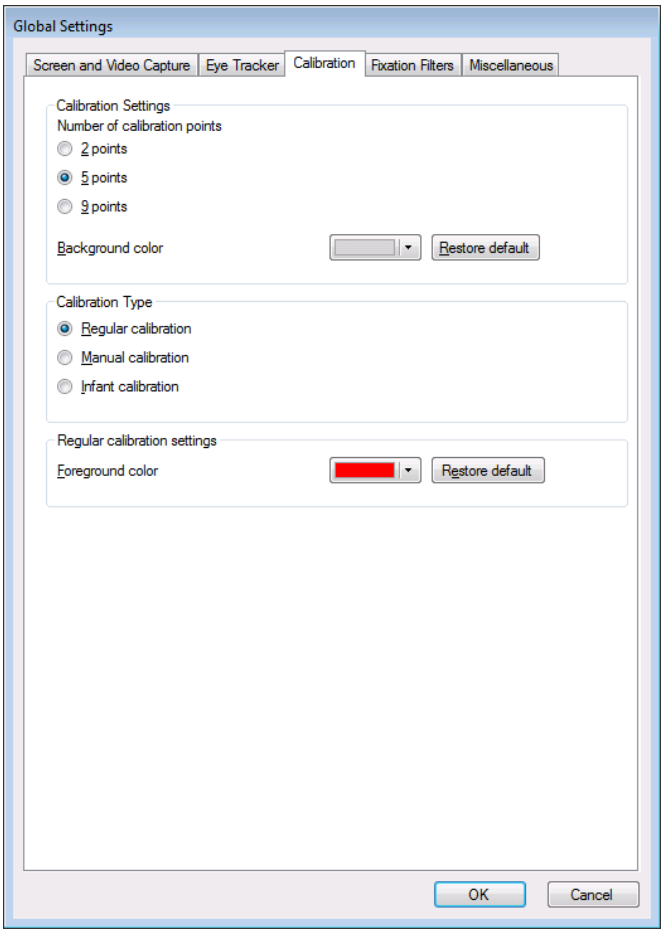
Select background color from the drop down menu. Try to select a calibration background color similar to the stimuli (media) background color for best tracking quality.

Calibration Type

The alternative Regular calibration is checked as the default type. Verify that it is selected if other calibration types have been used.

Regular calibration settings

The color of the calibration points is set from the dropdown menu.



Manual calibration

Manual calibration is used when the scene camera media is used. Manual calibration also provides the ability to do a step-wise calibration, which is more suitable when calibrating people with poor vision or people who have problems following the dots in the regular calibration. The manual calibration is found under Tools -> Settings and the Calibration tab.

Manual Calibration Settings

The color of the lines in the cross can be changed under the Calibration tab where manual calibration is selected.

How to use it

Manual calibration is an operator-paced calibration procedure with special graphics during the calibration procedure. The number of calibration points and their locations are the same for the manual calibration as for normal calibration, but instead of a pulsating dot, two lines intersecting the calibration point are displayed. When the space bar is pressed, the lines change color while calibration is performed and the lines move to the next calibration point

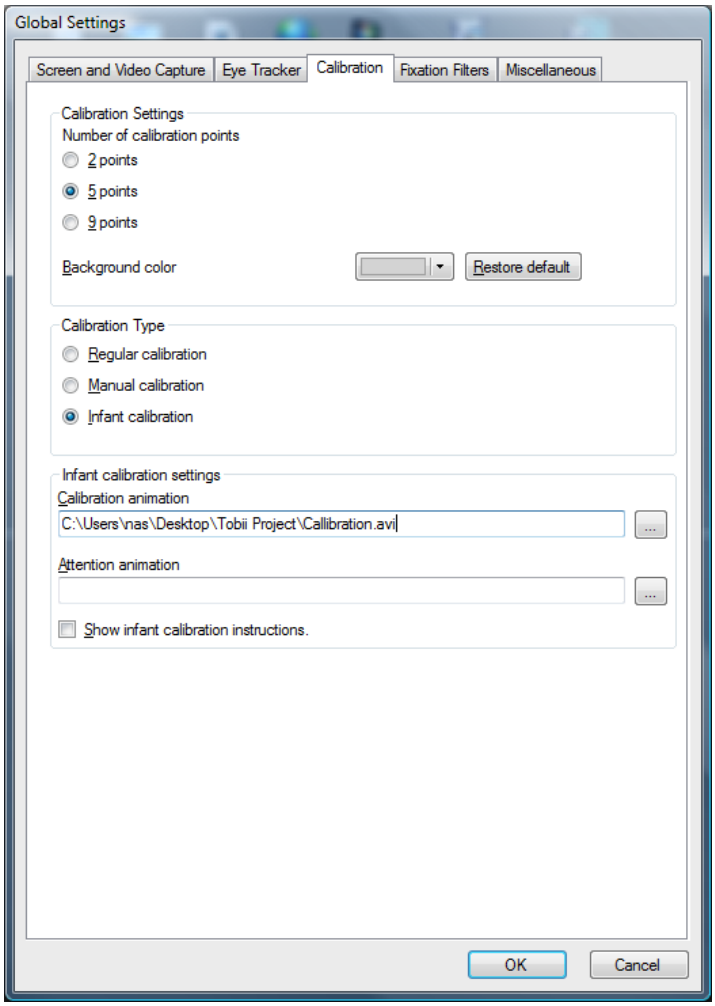
The calibration is performed after the space bar is pressed. Make sure the test subject doesn't move his/her gaze at the sound of the key press

When the participant has looked at all points, the calibration result will be shown. If the calibration went well, press Accept and the recording start dialog will be shown.

Infant Calibration

Infant calibration is used when doing studies on infants. Small movies are shown where the dots are normally shown. This works as an attention grabber suitable for small children. It can also be used when there are problems giving calibration instructions.

Infant calibration is found under Tools -> Settings and the Calibration tab.



Infant Calibration Settings

Select the movie to show as the calibration point, and optionally, one to show as an attention grabber. Some sample movies are included in the installation and can normally be found in the Infant Calibration AVIs folder, under My Documents -> Tobii Studio Media Files.

To see the instructions for the calibration directly on the screen during the calibration procedure check the box "Show infant calibration instructions".

It is also possible to set the background color and the color of the screen in the calibration setup.

How to calibrate

A movie (AVI) will be shown on the screen instead of the dot that is shown in the regular calibration. Infant calibration is an interactive calibration mode where an operator uses the keyboard to control the calibration procedure.

To show the calibration animation selected in the settings dialog, press the right arrow key. When the subject is watching the animation, press the right arrow key again to start collecting calibration data. It is assumed that the subject will focus on the center of the calibration animation. When enough data points are collected, the calibration will move on to the next calibration point. The operator can again press the right arrow to start collecting data. This is repeated until all calibration points are done.

Tobii Studio can also display an attention grabbing AVI if test subjects respond poorly or grow tired of the calibration AVI. To show it, press the up arrow key. To hide any animation playing, press the left arrow key. The attention grabbing AVIs that come with Tobii Studio are placed under *My Documents -> Tobii Studio Media Files -> Infant Calibration AVIs.*

To control the calibration process, the following keys are used:

- ***Right arrow:*** Displays the calibration AVI at the next calibration point. If the calibration AVI is already visible, a calibration is made on that point before proceeding to the next one.
- ***Left arrow:*** Pause. Hides the calibration AVI or the full-screen attention-grabbing AVI
- ***Up arrow:*** Displays the attention grabbing AVI

4.2.3 Calibration procedure

Positioning for Calibration

Ensure the test participant is sitting comfortably in front of the Tobii at a distance of approximately 60 cm or 70 cm. The distance depends on the eye tracker model. Please read more in the eye tracker guide that was sent with the eye tracker. Open the Track status window found under *View -> Show Track Status*. Adjust the chair, table, or eye tracker stand until two dots representing the eyes are shown in the middle of the track status window and the status color on the bottom of the track status window shows green.

Perform a Calibration

To calibrate a participant select the Record icon at the bottom of the Design and Record view. Once a participant is created or selected and the Continue button is clicked, the calibration dialog with a track status will appear. Make sure the track status looks good and click the Calibrate button.

During calibration, the test participant should concentrate on focusing the eyes on these points. The test participant does not have to keep his/her head still during calibration – in fact, relaxed movement tends to improve calibration quality.

The Tobii eye tracker has unique "long-lasting" calibrations, which allow individual calibrations to be re-used for later test sessions. However, for maximum accuracy, it is recommended to perform a new calibration before each separate test session.

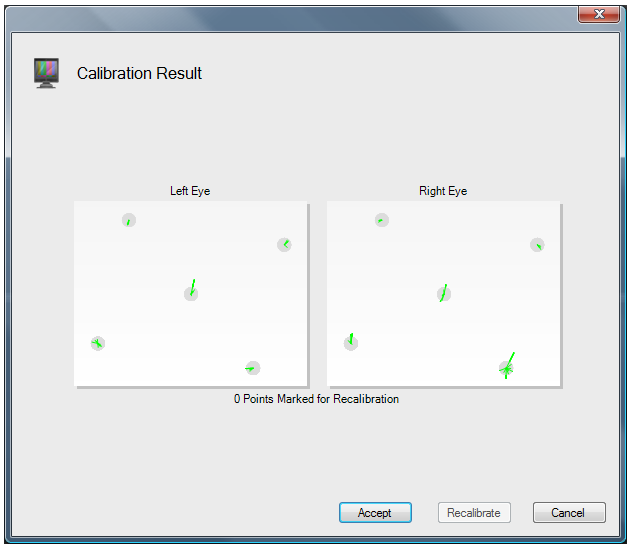
There are several options to customize the calibration procedures to suit a particular subject or study. These settings are found under the setup for each calibration option.

Calibration Result

When the process is complete, a screen will be displayed showing the calibration result. If the calibration result is good, click Accept to start a recording. If the result for one or more calibration points is not satisfying, mark the points for recalibration and click the Recalibrate button.

Recalibrate

The calibration plot shows error vectors and if the lines are long it is good to recalibrate. It is also good to recalibrate those calibration points that were not picked up by the eye tracker. Mark points to improve calibration for and press recalibrate to start a new calibration.



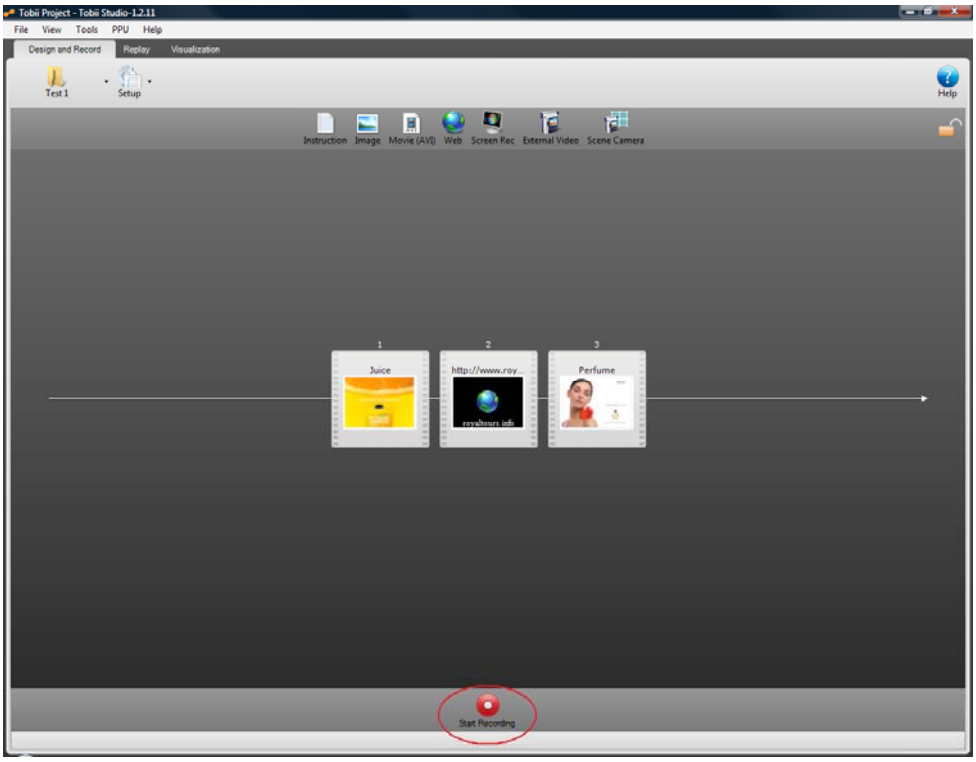
If the calibration was not successful the calibration result "Not Enough Calibration Data" will be displayed, when this is shown make sure the test participant is placed correctly in front of the eye tracker and select Recalibrate.

4.3 Recording

Start a recording by pressing the Start Recording button. A calibration will be performed before the actual recording starts. More information about this can be found under the chapter, calibration. Follow the instructions on the screen.

Start recording

The Recording button can be found in the Design and Record view in Tobii Studio. Click the button and follow the instructions on the screen.



Before recording

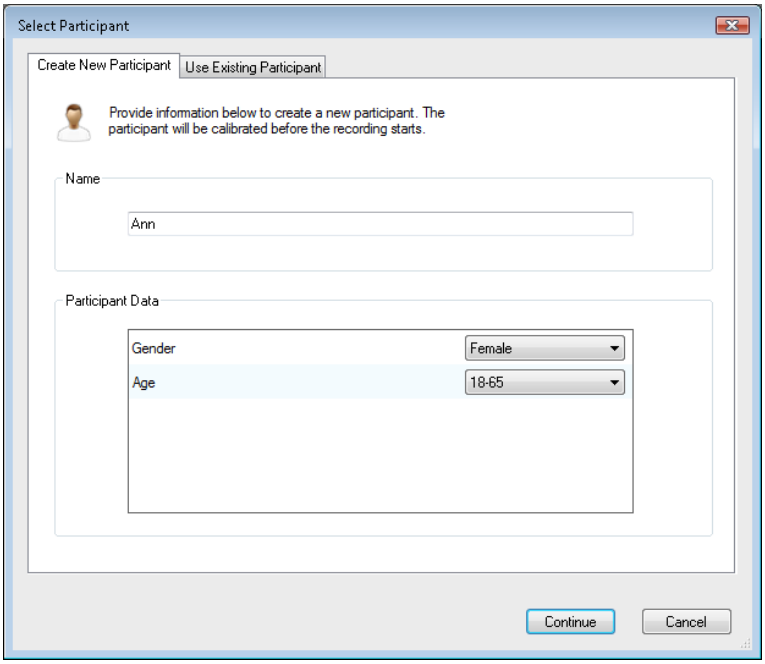
Make sure Tobii Studio is connected to the eye tracker and that study settings such as user camera and participant data are made before starting a recording. Read more in the chapter study settings. Media to show during the recording also have to be set up. Read more in the chapter design.

End recordings

There are different show time options for different media types. See more in the chapter, media. Recordings can always be ended by pressing the **F10** or **Esc** button.

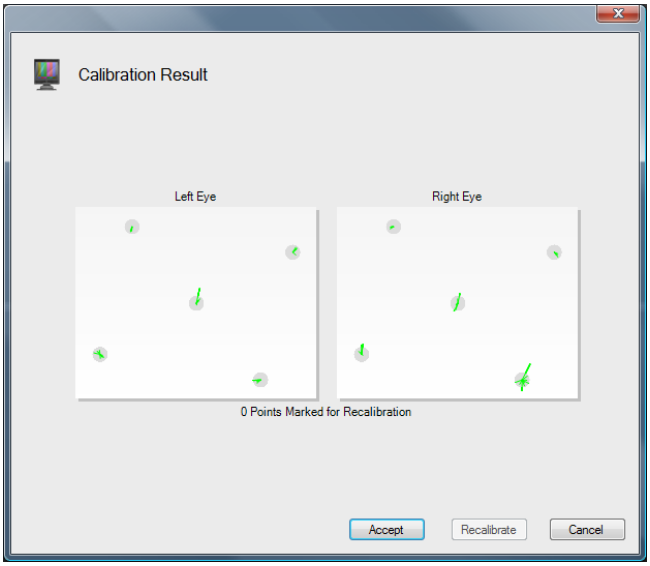
Perform a recording

1. Place the participant in front of the eye tracker. Make sure that the person is sitting comfortably in front of the tracker at a distance of approximately 70 cm. The distance depends on the hardware used; 70 cm is valid for the TX Series. For the 50-series the distance is 60 cm (please see our hardware guides for more information).
2. Click *Start Recording* in the *Design and Record* view. A dialog for filling out participant name and data appears. Participants that have already been created can be selected from the *Use Existing Participant* tab. The data can be changed at any time after the recording.

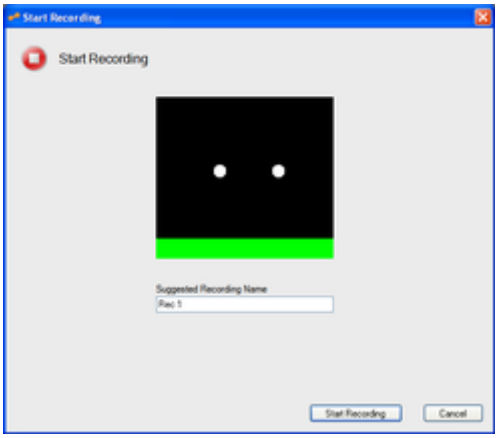


3. Click *Continue* to start the calibration of the participant.
4. A track status box appears. Make sure the eyes are detected by the system as in the picture below and click *Start*.

5. Calibration points appear on the screen. Instruct the participant to look at the points as they move over the screen. The calibration will stop automatically when the configuration is completed. Note that the calibration settings can be changed in the settings menu.
6. When the calibration is done, a window with the calibration result appears. The shorter the lines out from the points, the better the calibration. The calibration below is successful. Read more in the calibration chapter.



7. Click *Accept* if the calibration is fine; otherwise click *Recalibrate* to improve the calibration.
8. The recording window appears. Enter a name for the recording. Make sure to use informative names.
9. Click *Start Recording* to show the media setup in the design phase and start tracking.



10. The recording finishes with the last media in the setup. Depending on your settings per media, it will be an automatic ending with time offset or require a mouse click or a key press by the participant. How recording of different media can be ended is explained more in detail in the chapter Media.

Recordings can always be ended with F10 or Esc independent on settings for the media.

11. When finished with the recording, go to the *Visualization* view or *Replay* view to analyze the data.

4.4 Monitoring and Logging

The Live Viewer, local or remote, is used to monitor a recording session. It shows the stimuli background with gaze overlay on a supervisor/test leader screen during the recording. If the user camera is used, an image of the test participant will also be shown.

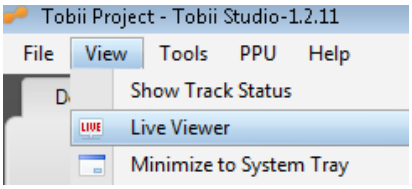
Events can be logged and used to for example see gaze patterns at specific events and to create clips. A keyboard button or mouse click can be used to log specific events during or after the test. Events can be logged either in the Replay view in Tobii Studio during the post analysis or from the Tobii Studio Logger during the test.

4.4.1 Local Live Viewer

The Live Viewer shows the stimuli background with gaze overlay during the recording. If the user camera is used, an image of the test participant will also be shown. Drag the Live Viewer to the supervisor screen, which should be the secondary screen in the setup. Read more about screen settings under the chapter, Computer Settings.

Start the Live Viewer

The Live Viewer is found in the View menu and in the Setup menu.



If a user camera is connected it has to be enabled under Setup or Tools -> Settings.

Screen Setup

To show the Live Viewer on a secondary screen, the computer has to have a dual head graphics card or a splitter has to be attached to the monitor port of the computer.

See the section, Configure Monitor Setup, under the chapter, *Computer Settings*.

Screen Settings

Some settings can also be found in the Live Viewer On-Screen Menu, which will appear if you right-click in the Live Viewer window.

- ***Send Window to secondary screen:*** The Live Viewer window will automatically be moved to the secondary screen, which should be the non-eye tracker screen. The Live Viewer window can also be moved to the secondary screen with drag-and-drop.

- ***Full screen:*** When selecting this option, the Live Viewer window will be maximized to cover the full screen of the secondary screen.
- ***Primary screen size:*** If the Live Viewer window should be the same size as the primary screen shown to the test participant, select this option.
- ***Resizable***: This setting has to be checked before the Live Viewer window can be resized to optional size. It can be resized by dragging the borders and corners of the window with the mouse.

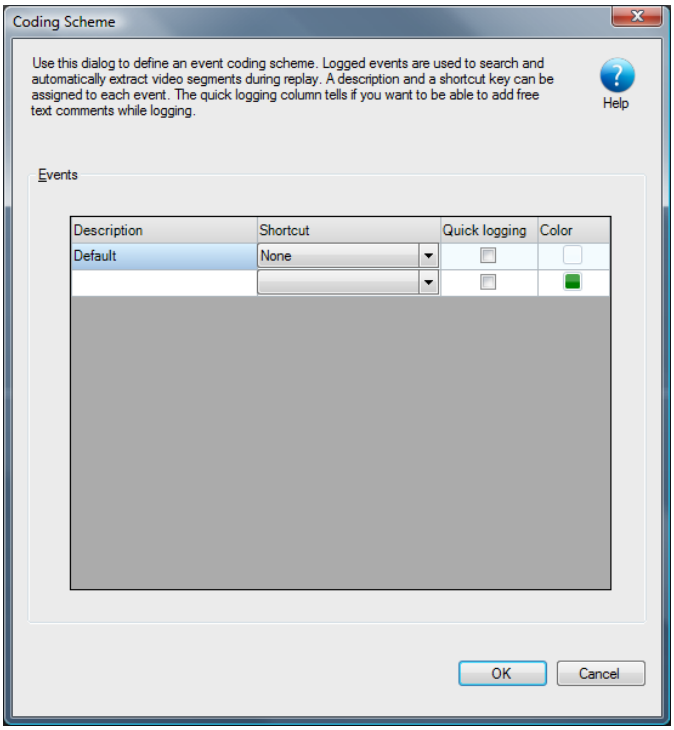
Gaze Data

By default, the gaze data overlay will be shown in the Live Viewer. If the test is to be supervised without showing the eye gaze data, make sure to deselect the option, *Overlay gaze data,* in the on-screen menu found by right-clicking in the Live Viewer window.

The gaze data will still be saved and will be available for analysis in Tobii Studio after the test is ended.

4.4.2 Coding Scheme

Before events can be logged, a coding scheme has to be defined. The coding scheme, the settings for the logging, is found under *Tools -> Coding Scheme.*


Coding Scheme
Use this dialog to define an event coding scheme. Logged events are used to search and automatically extract video segments during replay. A description and a shortcut key can be assigned to each event. The quick logging column tells if you want to be able to add free text comments while logging.
Help
Events
Description
Shortcut
Quick logging
Color
Default
None
OK
Cancel

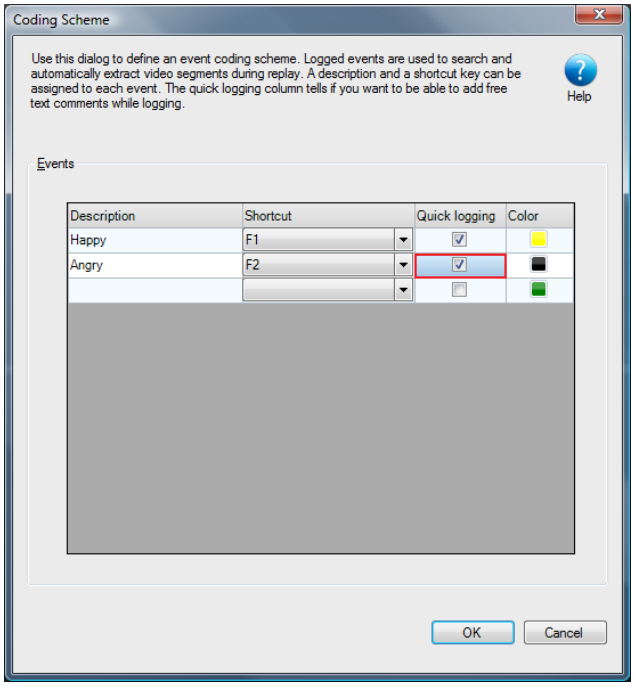
User defined log events with optional keyboard shortcuts can be added to the test. To define events, follow the steps below:

1. ***Description:*** Click on the empty line under *Description*, type in the name/description of the event and press enter when done.
2. ***Shortcut***: Select a shortcut key for the event from the drop down menu. This button should later be pressed in Tobii Studio Logger to add the event or in the

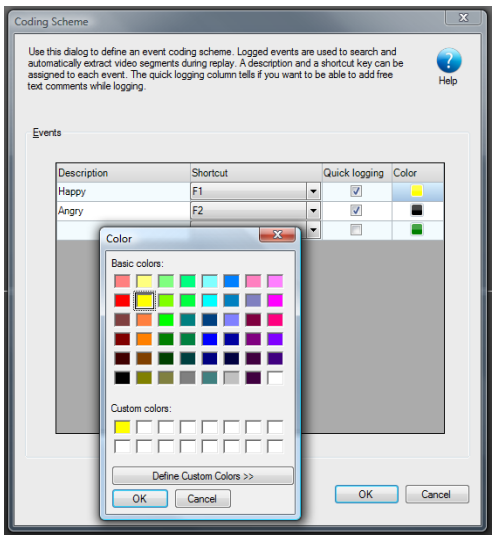
Replay view in Studio when replaying the recording. How events are logged is described under Logging Events.

3. ***Logging Options:*** Log messages or comments can be included when logging an event. A window for the log message or comment and an event selection will appear when pressing the log key.

   If no text is to be entered during logging and for quicker event logging select the option, *Quick Logging*. If *Quick logging* is checked, no window for adding comments to the events will appear when pressing the log key. The event will still be logged and will be listed in the event list and shown as a marker on the time line in the replay view.


Coding Scheme
Use this dialog to define an event coding scheme. Logged events are used to search and automatically extract video segments during replay. A description and a shortcut key can be assigned to each event. The quick logging column tells if you want to be able to add free text comments while logging.
Help
Events
Description
Shortcut
Quick logging
Color
Happy
F1
Angry
F2
OK
Cancel

4. ***Color:*** The color of the markers for the events shown on the timeline in the replay view can be changed in the color palette, which appears when double-clicking the color icon.



4.4.3 Tobii Studio Logger

The Tobii Studio Logger is a separate software component that can be opened on a remote computer to supervise a test and log events. The Tobii Studio Logger is not available in all version of Tobii Studio.

The Tobii Studio Logger is found in the windows Start menu under All Programs -> Tobii -> Studio

With the Tobii Studio Logger, a test screen with gaze data overlay (Live Viewer) and user camera picture can be shown on a remote screen. Recordings can be started and controlled and events can be logged. The Tobii Studio logger can be opened on a computer in the same or different room than where the test on the Tobii Studio is taking place. It can also be used to show a recording in real-time in a conference room.

For different setup options see the system recommendations.

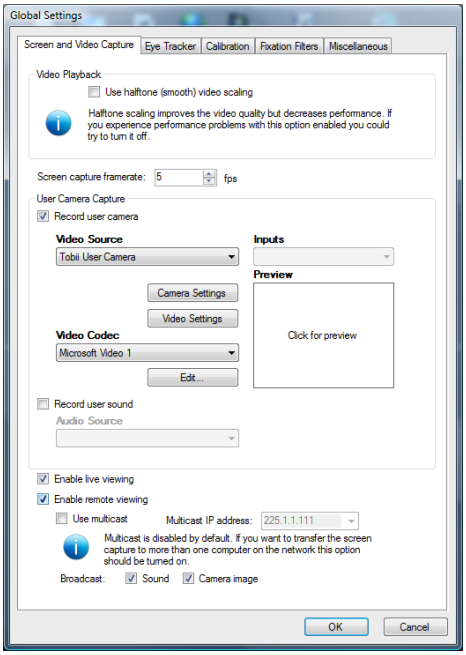
Starting Tobii Studio Logger

Before starting a recording and adding logging events from the Tobii Studio Logger make sure the Tobii Studio Logger is set up properly.

The following settings have to be made in Tobii Studio and Tobii Studio Logger.

1. ***Enable remote viewing:*** In Tobii Studio go to *Tools -> Settings -> Screen and Video Capture*. Make sure the option, Enable remote viewing functionality, is selected. If user camera and/or sound is to be used this has to be enabled as well.

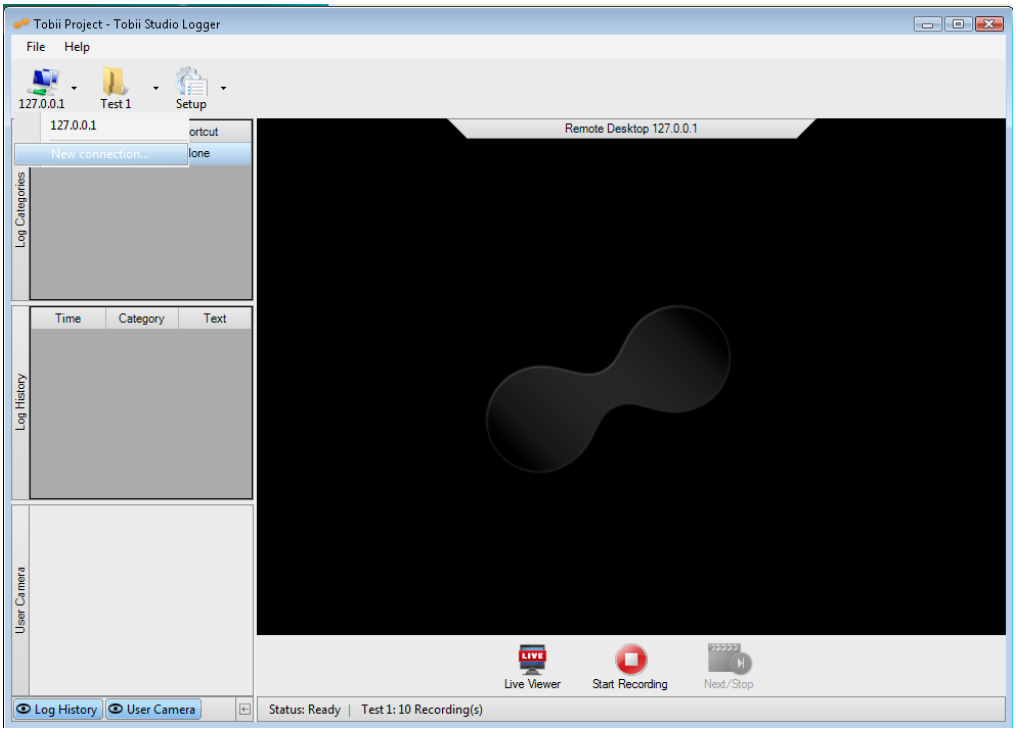
   If Tobii Studio Logger is to be used for remote viewing on more than one computer the option *Multicast* has to be selected. If only one remote computer is used for Logging or remote viewing do not select this option since it might degrade performance.



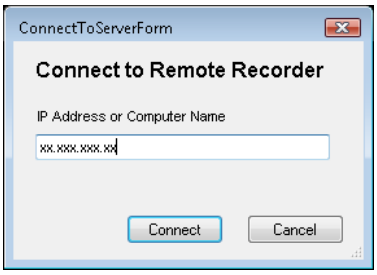
2. *Connect the Tobii Studio Logger to the Tobii Studio computer*

IP address

Enter the IP address for the computer where the recordings in Tobii Studio are to be done. Click on New Connection to enter a new IP address.



Enter the IP address for the Tobii Studio computer.



Finding the IP Address for the Tobii Studio Computer

If *Multicast* is selected and Tobii Studio Loggers used for remote viewing on more than one remote computer enter the Multicast IP address found in the Sceen and Video Capture view in the Global Settings. (See step 1 above).

If Tobii Studio Logger is opened on one computer follow the instructions below to find the IP address:

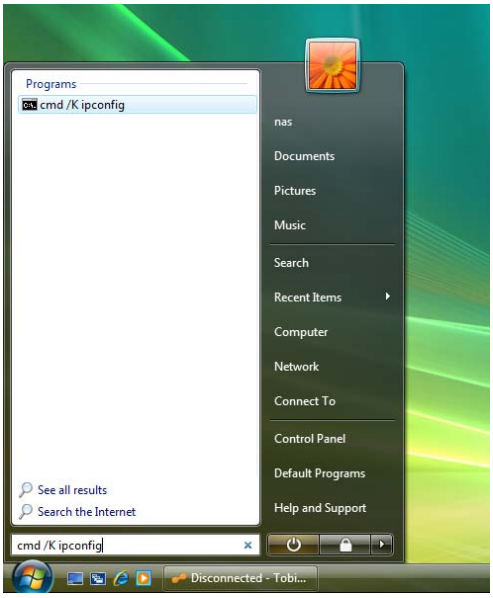
A. Click on the windows Start menu and select Control Panel

B. Click on the Network Connections icon

C. Double click on the Network Connection (normally the Local Area Connection)

D. In the Connection Status window select the Support tab where you can see the IP address.

Or in Vista simply go to the start menu and enter cmd /K ipconfig

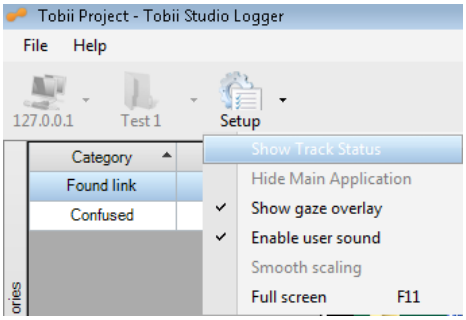


4. Start the Live Viewer. Make sure the user camera and sound are selected if they are being used during the study. If they are not, close the Tobii Studio Logger and go to the settings menu in Tobii Studio to set up the user camera.

4.4.4 Log events in Tobii Studio Logger

Before events can be logged in Tobii Studio, Logger events have to be defined in Tobii Studio. Read more under Coding Scheme. Once this is done, shortcut keys can be pressed to log events in Tobii Studio Logger during the recording.

1. Start the Live Viewer in Tobii Studio Logger, make sure the user camera is selected if it should be used during the study. If it is not, close the Logger and go to the settings menu in Studio to set up the user camera.
2. Make sure the participant is seated properly in front of the eye tracker and start the recording. To make sure the eye tracker can register the eye movements open the track status, found in the Setup menu in the Tobii Studio Logger. More information on the track status meter can be found in the chapter, Track Status.



During the recording, press the shortcut button defined under the coding scheme (logging scheme) in Tobii Studio, or press the log category line in the Tobii Studio Logger whenever an event is to be added.

3. Add a comment in the Log Message that appears when logging events. It will not appear if quick logging is selected, read more under *defining logging events.*
4. When the recording is finished go to the Replay view in Studio to see the added events. A marker indicating the event will be displayed on the timeline and the event will be listed in the Events list to the left in the replay view. Read more about how to use the events under Create clips in the chapter *Replay*.

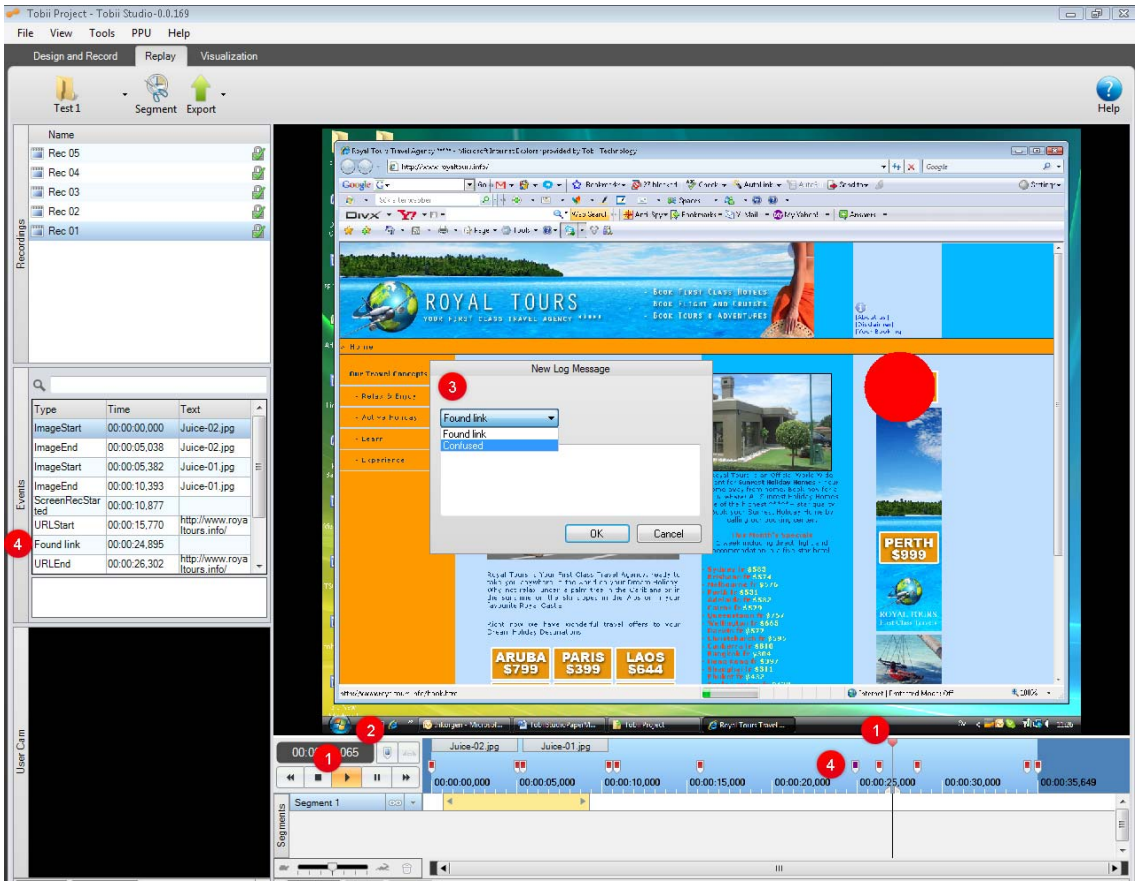
4.4.5 Post analysis logging

A keyboard button or mouse click can be used to log specific events. If events are added after the recordings are made the events are logged in the replay view.

The events will be shown in a list next to the recordings in the replay view as well as event markers under the recordings in the same view.

Logging Events in the Replay View

1. Press the play button or drag the timeline marker to where the event is to be added.
2. Press the shortcut button defined under the coding scheme (logging scheme) or press the log comment button and select event from the drop down menu.
3. Add a comment in the Log Message. It will not appear if quick logging is selected. Read more under defining logging events. When done click OK.
4. A marker indicating the event will be displayed on the timeline and the event will be listed in the Events list to the right in the replay view. Read more about how to use the events under, Create clips and AVI Export in the chapter, Replay.


Tobii Project - Tobii Studio-0.0.169
File View Tools PPU Help
Design and Record Replay Visualization
Test 1 Segment Export Help
Recordings
Name
Rec 05
Rec 04
Rec 03
Rec 02
Rec 01
Events
Type Time Text
ImageStart 00:00:00,000 Juice-02.jpg
ImageEnd 00:00:05,038 Juice-02.jpg
ImageStart 00:00:05,382 Juice-01.jpg
ImageEnd 00:00:10,393 Juice-01.jpg
ScreenRecStarted 00:00:10,877
URLStart 00:00:15,770 http://www.royaltours.info/
Found link 00:00:24,895
URLEnd 00:00:26,302 http://www.royaltours.info/
User Cam
ROYAL TOURS
New Log Message
Found link
Confused
OK
Cancel
ARUBA $799
PARIS $399
LAOS $644
PERTH $999
Juice-02.jpg
Juice-01.jpg
00:00:00,000
00:00:05,000
00:00:10,000
00:00:15,000
00:00:20,000
00:00:25,000
00:00:30,000
00:00:35,649
Segment 1
Segments
1
2
3
4

5. Replay

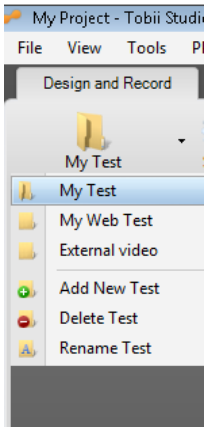
The gaze replay is a way to dynamically visualize a gaze recording. It shows the gaze path overlaid on top of the stimuli, whether it is a still image, a slide show, or a movie.

A user camera can be used to film the test participant during the recording. The film will be shown next to the media at replay.

To replay a recording the play button is pressed. There are also rewind, forward, stop and pause buttons in the replay menu.

Test list

The first step in the replay view is to select the test to show replay for or create movie clips from. All tests in the opened study are shown in the test list. If the test is in a different study go to File -> Open Study.



Recordings list

A list with all recordings in the test is shown on the left side in the replay view. Mark a recording to view a replay or to create clips or scenes.

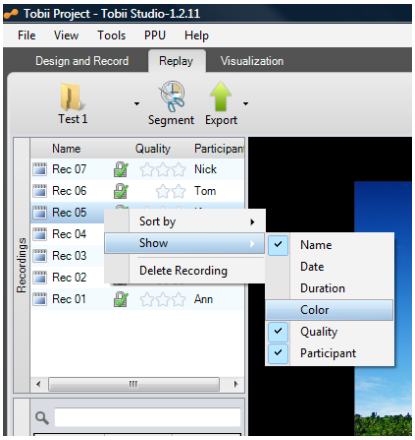
Right-click anywhere in the recordings list to select what kind of data to show for the recordings. The recordings can also be sorted after the different data.

The data available to display and sort in accordance with are:

- *Name* of recording
- *Date*, when it was recorded
- *Duration*, how long the recording was
- *Color*, the color, which is also representing the recording as a dot on the timeline in the replay view and in the visualization tools.
- *Quality*, how well the participant was tracked during the recording represented by different numbers of stars. Highest tracking quality will result in three stars. When holding the mouse over the stars a tracking percentage will appear. 100 % means that both eyes were found during the whole recording, 50 % that one eye was found for the full recording or both eyes during half of the time. Note that the eyes cannot be found when a person is looking away from the screen, which results in a lower percentage. If the test is performed in such a way that the participant is asked questions during the recording and is looking at a test leader this might not be a good way to measure the quality of the data.

- *Participant*, the name of the test participant

The option to delete a recording is also found in the menu appearing when right-clicking in the recordings list.

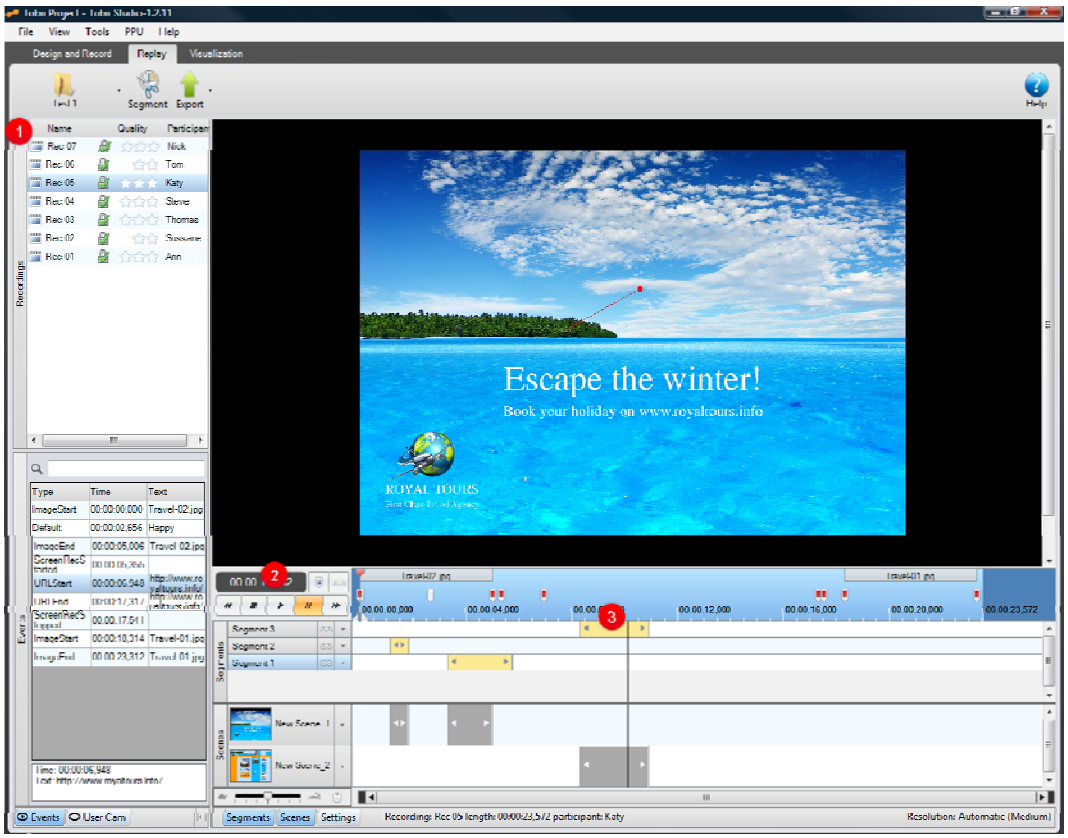


5.1 Replay of the recording

1. In the Replay view, select a recording to replay.

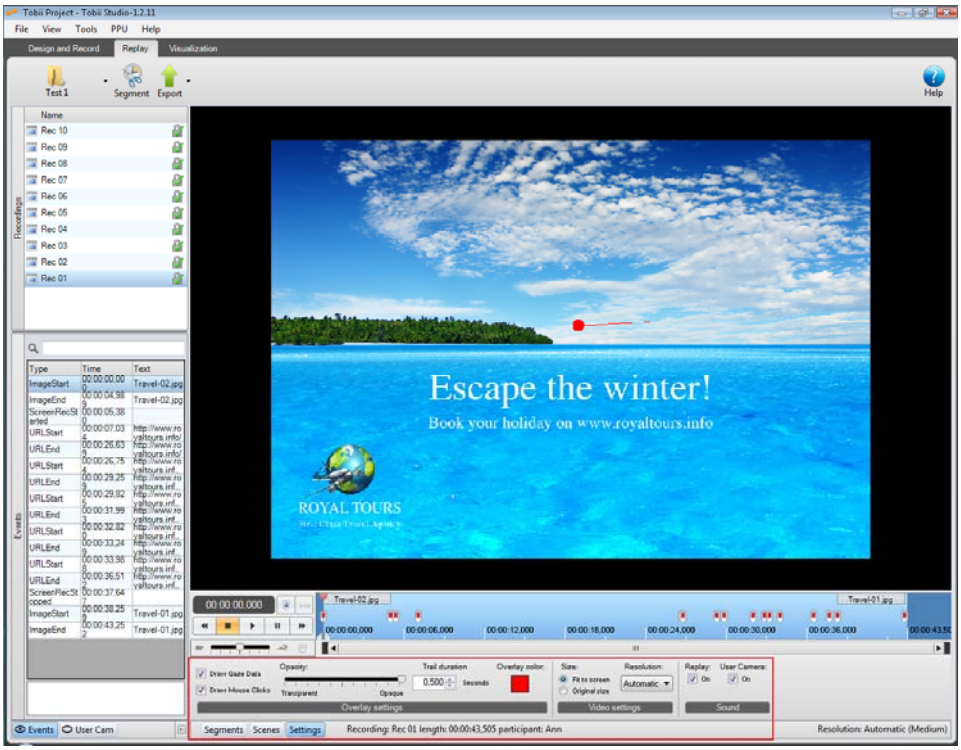
2. Press the play button to start the replay. There are also rewind, forward, stop, and pause buttons available. The left and right arrow buttons can be used to jump one frame forwards or backwards.

3. Position the time line marker at different positions on the time line to show the image with gaze overlay for that specific moment.



5.2 Replay settings

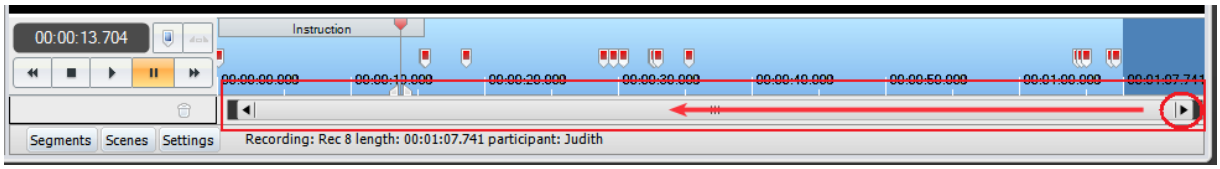
The gaze and video settings such as transparency of the gaze overlay and the size of the image can be adjusted under the settings tab.



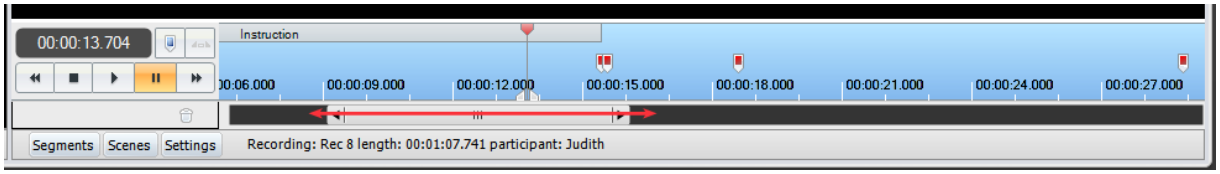
Timeline Scaling or Zooming

The timeline can be rescaled to show shorter time intervals. This can be useful when creating segments from a long recording or when it is important to be able to advance the replay slowly.

Mark the arrow on the end of the scaling axis and change the scale by dragging the arrow towards the middle.

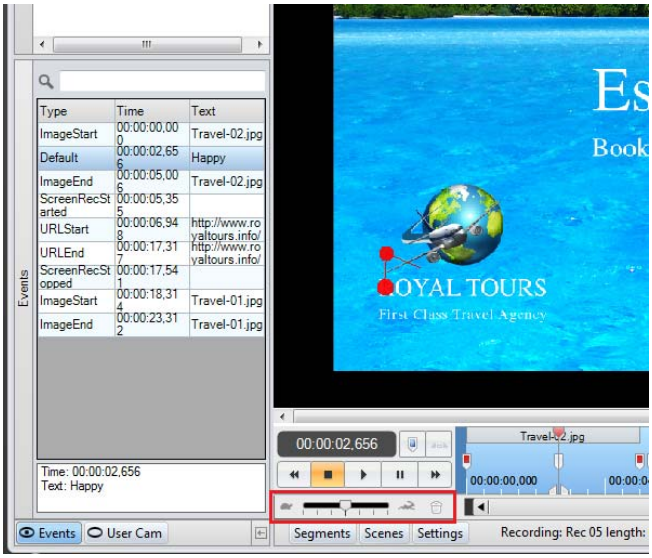


Drag the timeline selection to see earlier or later part of the recording.



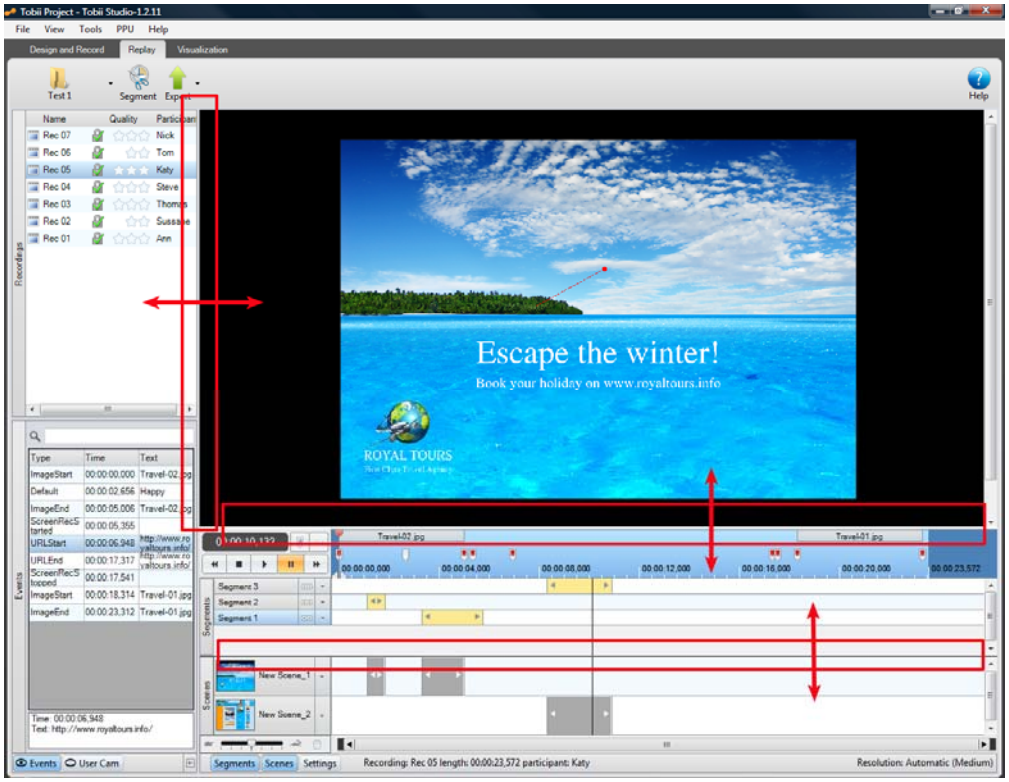
Replay Speed

The speed of the replay can be changed to show the replay of the recording in slower or faster pace. Drag the marker on the speed bar towards the rabbit to increase the speed and towards the turtle to lower the speed. The middle line, at which the marker is set in the image below, is the default setting. When this is selected the replay of the recording will be in true speed.



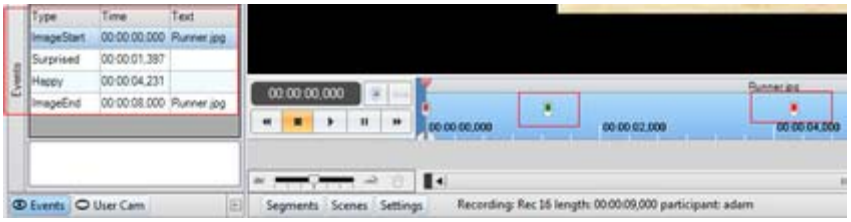
Resizing the different parts of the replay view

To be able to see all segments and scenes, resize the movie replay view, segmentation, scene and settings windows. This is done by dragging the lines marked in the image below.



5.3 Events

Events such as a picture being shown, a movie starting and mouse clicks will be listed in the replay view. User defined events added via logging, such as a participant clicking on a link on a web page, will be in the list. The events are also shown with event markers on the timeline. Hold the cursor over the event markers to see details for the event. When an event is marked in the event menu, the time line main marker will be placed at the time line at the time when the event occurred.



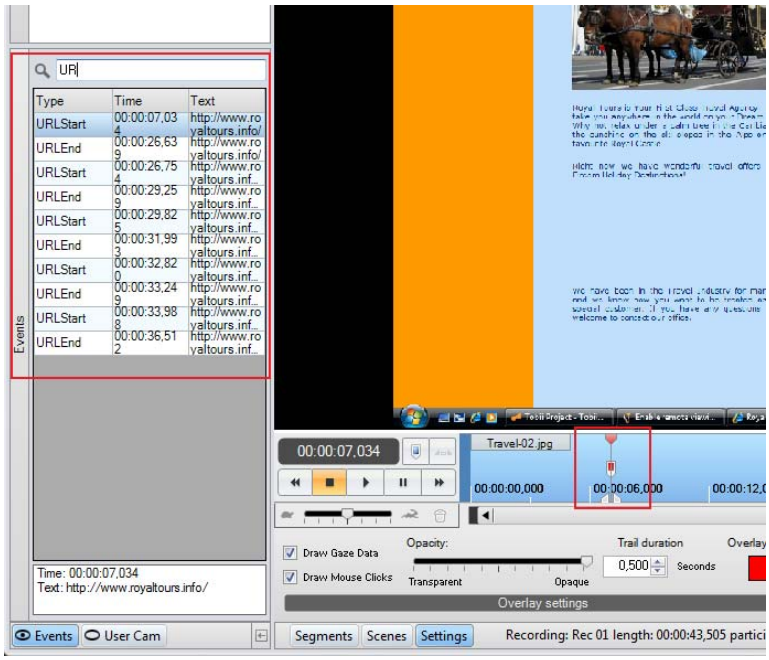
The events can be used to see when something has happened during the recording. Examples are start and end of a movie or a mouse click done by the test participant during the recording when, for example, clicking to view the next image or movie.

Events can also be used to create segments.

Segments are used to export movie (recording) clips and to create scenes which make it possible to create heat maps etc for media like movies and dynamic web pages. Read more in the chapter, Segments.

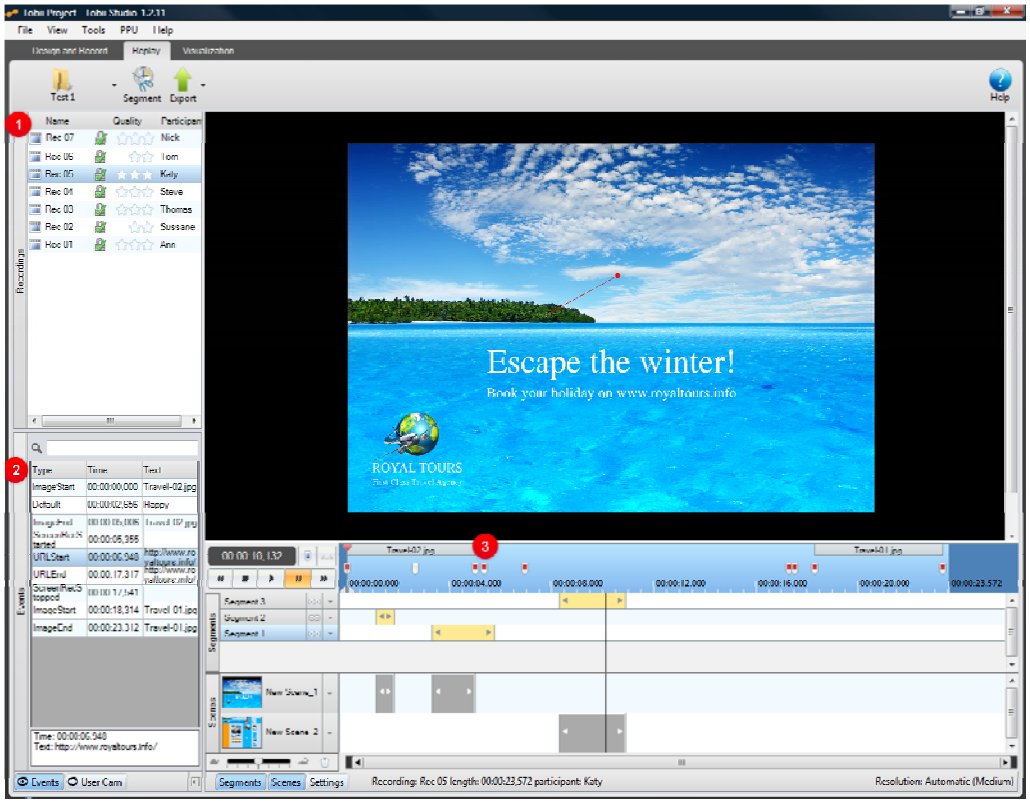
Events can be logged either in the Replay view in Tobii Studio during the post analysis or from the Tobii Studio Logger during the test. A keyboard button or mouse click can be used to log specific events by the test leader during or after the test. Read more in the chapter, Logging.

The events can be filtered to show only specific events in the list. Enter the first letters in the event on the line above the event list.



Events step-by-step

1. Select a recording to show and handle events for.
2. To view an event, click on the event in the Events list where all events are displayed. The events can be filtered to show only specific events in the list. Enter the first letters in the event on the search line above the list. The time line main marker will be placed at the point on the time line when the specific event occurred.
3. To view details about an event you can hold the cursor over the red or green marker on the time line (red markers represent events logged by the system; green markers represent manually logged events).



5.4 User Camera

A user camera to view and record the participant can be used. Settings for the user camera are made in the Screen and Video Capture menu in the Design and Record view.

If no camera image appears, check the settings, make sure the user camera drivers are installed and verify that the camera should work with Tobii Studio. For camera recommendations, please see the system recommendations.

By clicking the tab where it says User camera, right under the user camera image, it is possible to hide and view the user camera window.

5.5 Segments

A segment is a part of the recording. The segments can be exported as movie clips to be viewed in external media players.

Segments can also be used to create a scene, which is recommended if segments or scenes are created from events using the Segment tool. Scenes have to be created for recordings where the media types, Screen Recording or Movie (AVI), have been used in order to be able to use the different visualization tools. Scenes can also be created directly see more in the chapter, Scenes.

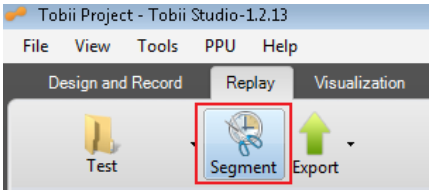
How to create a segment

Segments or clips of the recording can be created manually or automatically by using events and time offsets.

In the auto-generate segments, tool segments are created from events and can be created for several recordings at once and as several clips from a recording. Segments created manually are created in the Replay view in the timeline. The timeline, the media image, as well as the event list are used as aids to create segments.

Auto-Generate Segments

To generate segments (clips) from the recordings, click the Segmentation button. Segments can be generated for one or several recordings at a time. An example could be creating a segment for the first 20 seconds for each recording in a test. Events as well as time periods can be used to create segments.



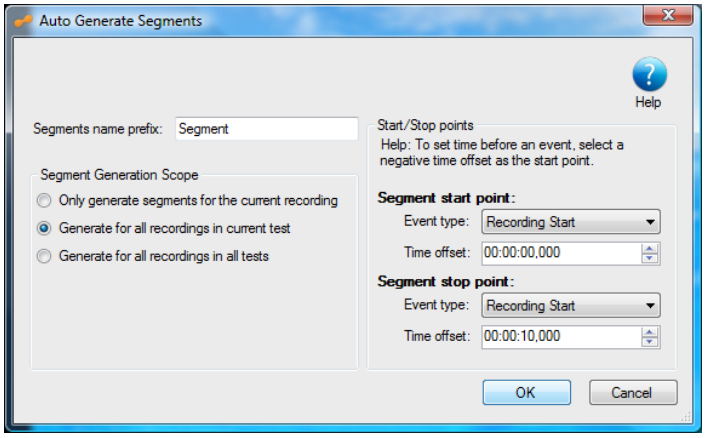
Generate segments from events

Events can be used as start or stop points for clips. A time offset can also be added to the event points to have a clip starting or stopping at a specific offset from the event.

In the Auto-generate segments' window, segments for the active recording, for all recordings in the test, or for the whole study can be created. Choose the events that should mark the beginning and end of the segment and also set the offset if used.

If the segment is to start at a point before the event, set a negative time offset.

If the start and stop events are the same type of event, for example, LeftMouseClick, the stop point event, Next LeftMouseClick has to be selected. Segments will be created between all left mouse clicks in this example.

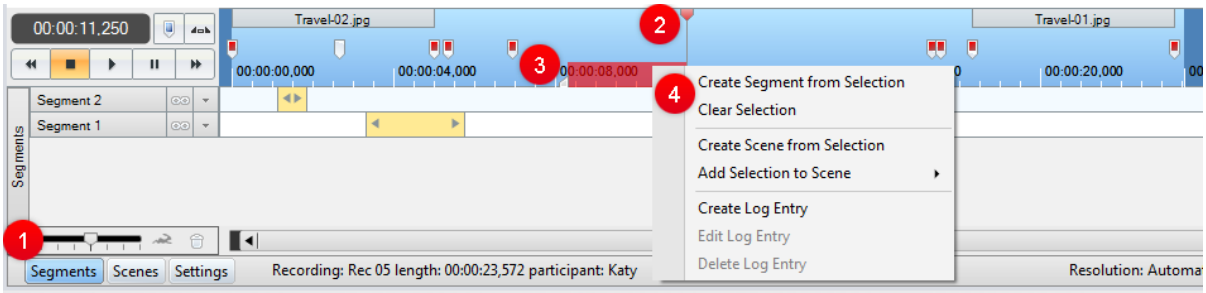

Auto Generate Segments
Help
Segments name prefix: Segment
Segment Generation Scope
Only generate segments for the current recording
Generate for all recordings in current test
Generate for all recordings in all tests
Start/Stop points
Help: To set time before an event, select a negative time offset as the start point.
Segment start point:
Event type: Recording Start
Time offset: 00:00:00,000
Segment stop point:
Event type: Recording Start
Time offset: 00:00:10,000
OK
Cancel

Generate Clips Manually

Go to the Replay view and choose the test you want to create clips for. Check the recording the clips are going to be made from

1. Press the Segments tab
2. Place the time line marker where you want the clip. If not clear where to start or end the segment click the timeline to see a preview, drag the marker on the timeline to adjust what is shown in the preview.
3. Drag the left time line marker to start position for the clip and the right time line marker to the end of the clip.
4. Click the Create clip in the segment menu or Right hand click in the marked region on the time line and choose, Create Segment from Selection.

Repeat the steps for all clips that should be generated.



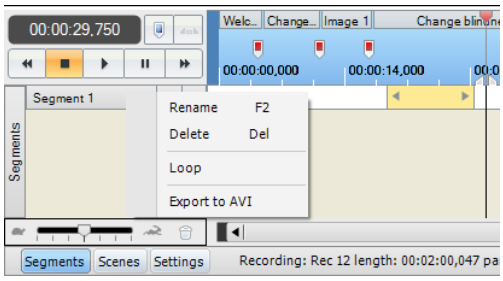
Export Recordings and Segments

Segments can be exported as a movie to be used in presentations. Read more in the export chapter.

Edit Segments

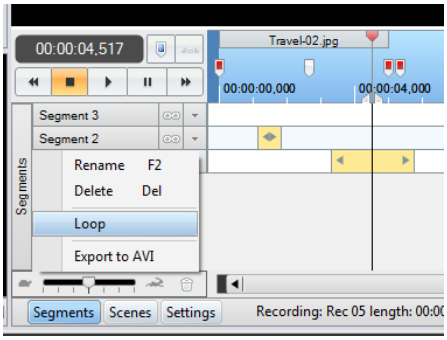
- *Rename* a segment by double clicking on the name and entering a new name. The name can also be changed in the segment menu which appears when right clicking on the segment name. See the image below.

- *Delete* a clip by clicking delete in the segment menu or by marking a segment and clicking delete.



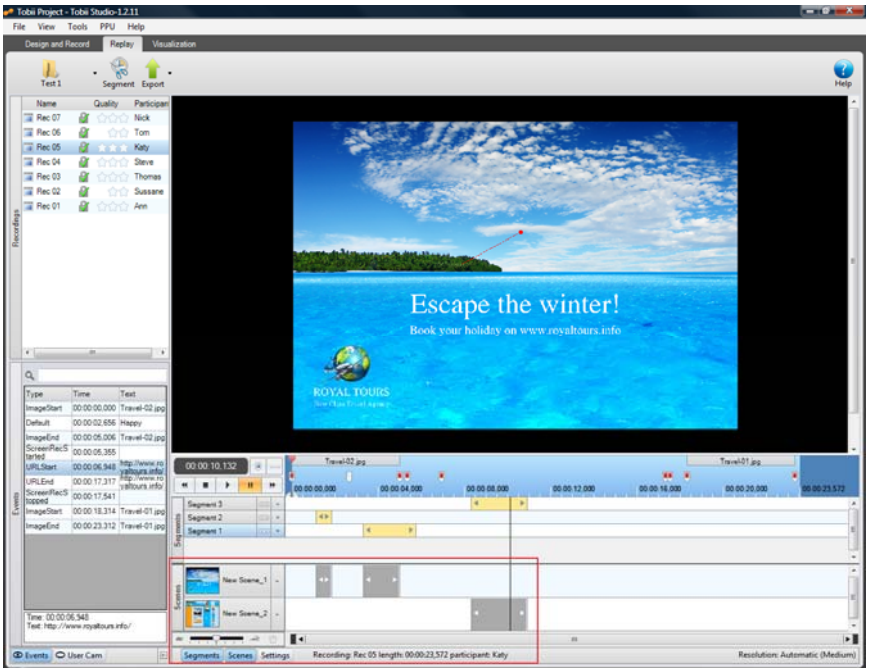
Loop Segment

It is possible to loop the replay of a segment. The option is found in the menu by the segment as seen in the picture below. Note that a segment has to be created to loop a replay, and that it will show the replay for one segment.



5.6 Scenes

To be able to use the visualization tools, recordings made with the media types, movie, screen recording, external video and scene camera, as well as for other dynamic content like flash web pages, have to be divided into scenes. A part of the recording; gaze data together with one background from the media is defined to create a static image. The tool for creating scenes is found in the Replay view.

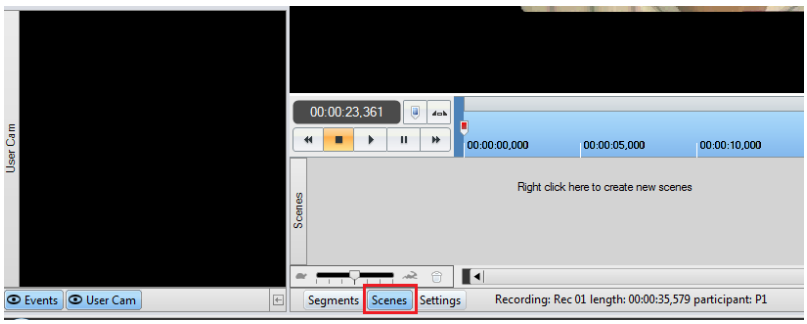


Creating a scene

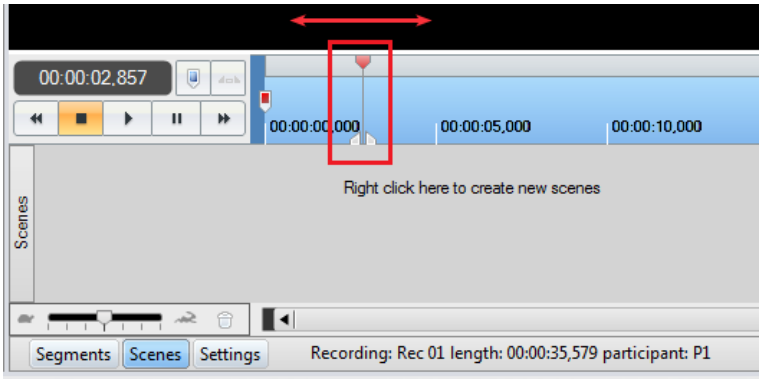
Scenes can be created directly on the timeline or from segments. To use Segments to create Scenes or to add Segments to a Scene read the next chapter *Use Segments to create a Scene*.

If creating Scenes from Selections on the Timeline follow the instructions below:

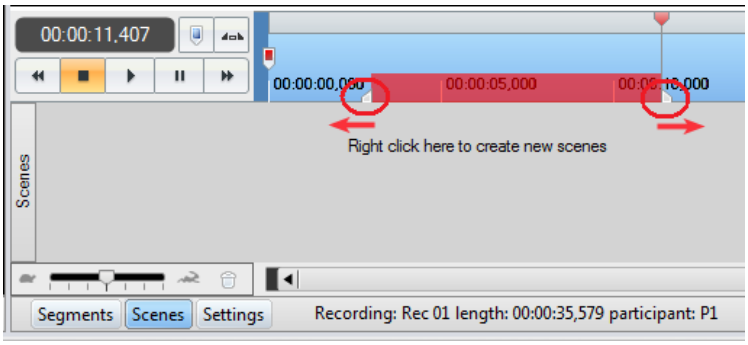
1. Click the Scenes tab to see the Scenes area and defined scenes.



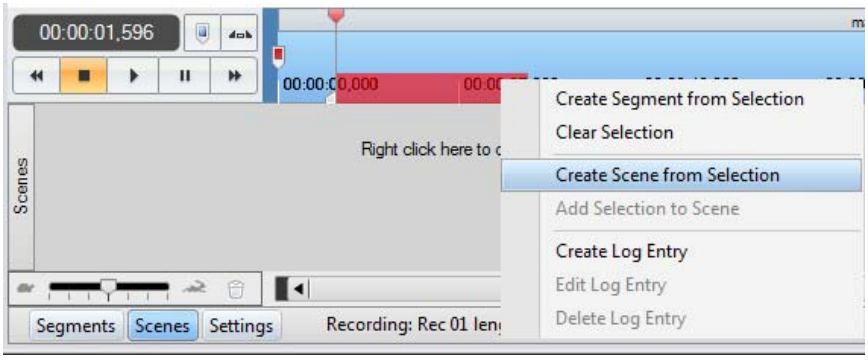
2. Make a Selection which is the part of the recording to include in the Scene. A Selection is made by placing the time line marker where a scene should be created. If not clear where to start or end the Scene click the timeline to see a preview, drag the marker on the timeline to adjust what is shown in the preview.



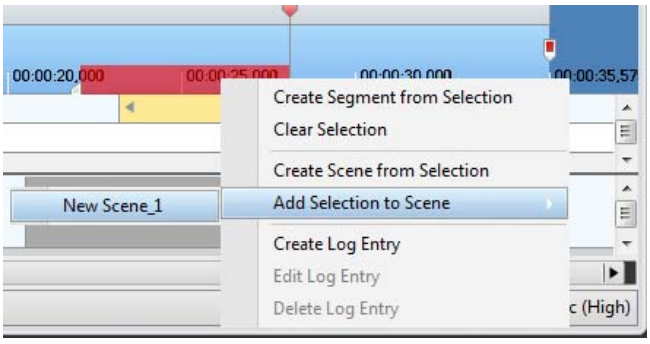
3. Drag the left scene marker to start position for the clip and the right scene marker to the end of the clip.



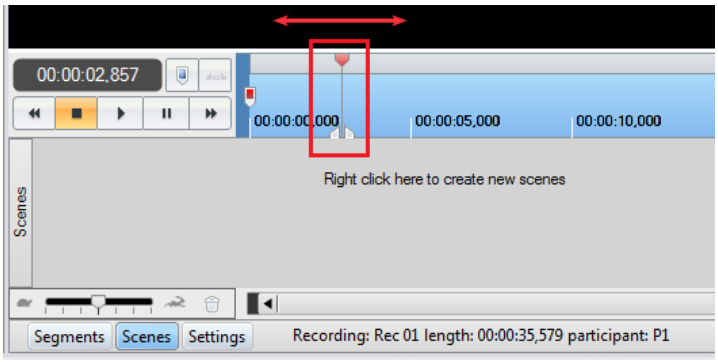
4. Right hand click in the marked region on the time line and choose Click the *Create Scene from Selection*.



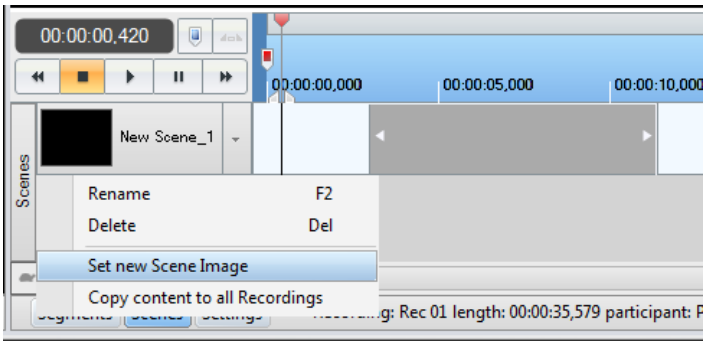
To add more Selections to the same Scene create a new Selection and add by selecting *Add Selection to Scene* and selecting scene to add it to.



5. Select background for the scene by dragging the timeline main marker to where the preferred background image is shown.



6. Open the Scene menu and select *Set new Scene image.*



7. *R*epeat the steps for all the scenes that are to be created.

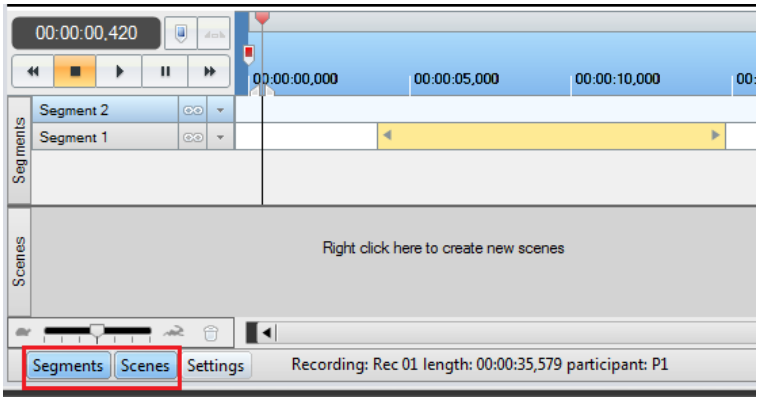
Create Scenes from Segments

Scenes can also be created from Segments which can be useful when wanting to use events or time offsets to create scenes. Segments can be added to a Scene and several segments can be included in one scene. Segments with the same or equivalent background are often grouped into one Scene.

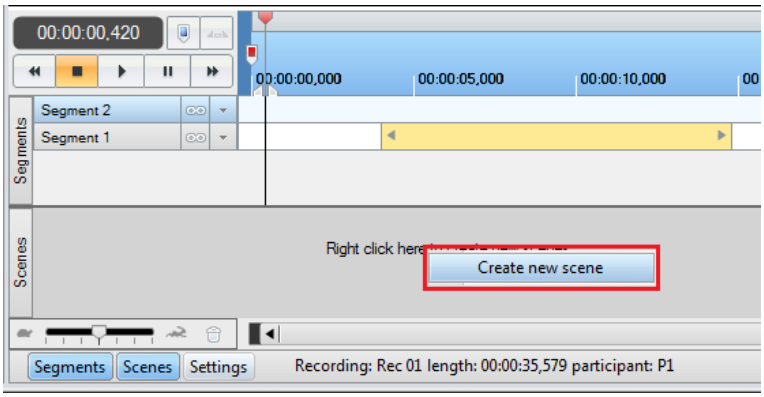
To add create a Scene from Segments or to add Segments to a Scene follow the instructions below:

1. Create Segments. Please see the previous chapter, Segments, to learn how to do this.

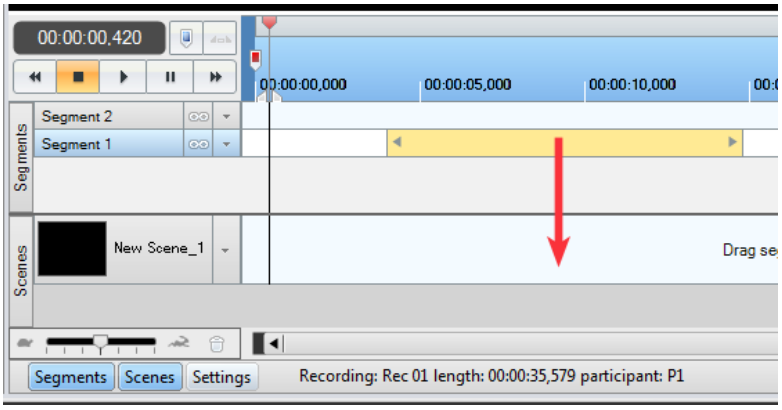
2. Mark the Segments tab and the Scenes tab to see the Segments and Scenes available and to create a new scene.



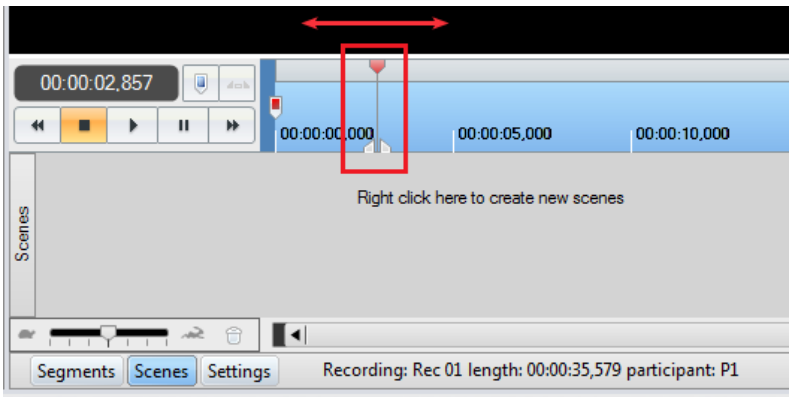
3. To create a new scene to add segments to, right click in the Scenes area and select *Create new scene*.



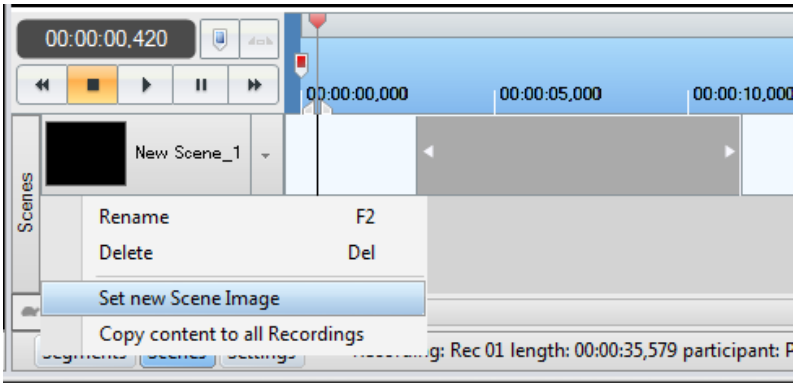
4. Add the Segments to the Scene or Scenes using drag-and-drop.



5. Select background for the scene by dragging the timeline main marker to where the preferred background image is shown.



6. Open the Scene menu and select *Set new Scene image.*



7. *R*epeat the steps for all the scenes that are to be created.

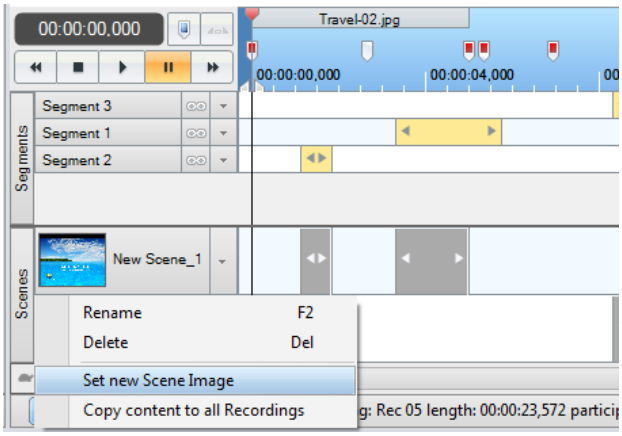
Edit scenes

Rename a scene

The name can be changed in the Scene menu. A scene can also be renamed by double clicking on the name in the segment list and entering a new name.

Delete a scene

The scene can be deleted in the Scene menu. A scene can also be deleted by marking the scene and pressing the delete button.


00:00:00,000
Travel-02.jpg
00:00:00,000
00:00:04,000
Segments
Segment 3
Segment 1
Segment 2
Scenes
New Scene_1
Rename F2
Delete Del
Set new Scene Image
Copy content to all Recordings
g: Rec 05 length: 00:00:23,572 particip

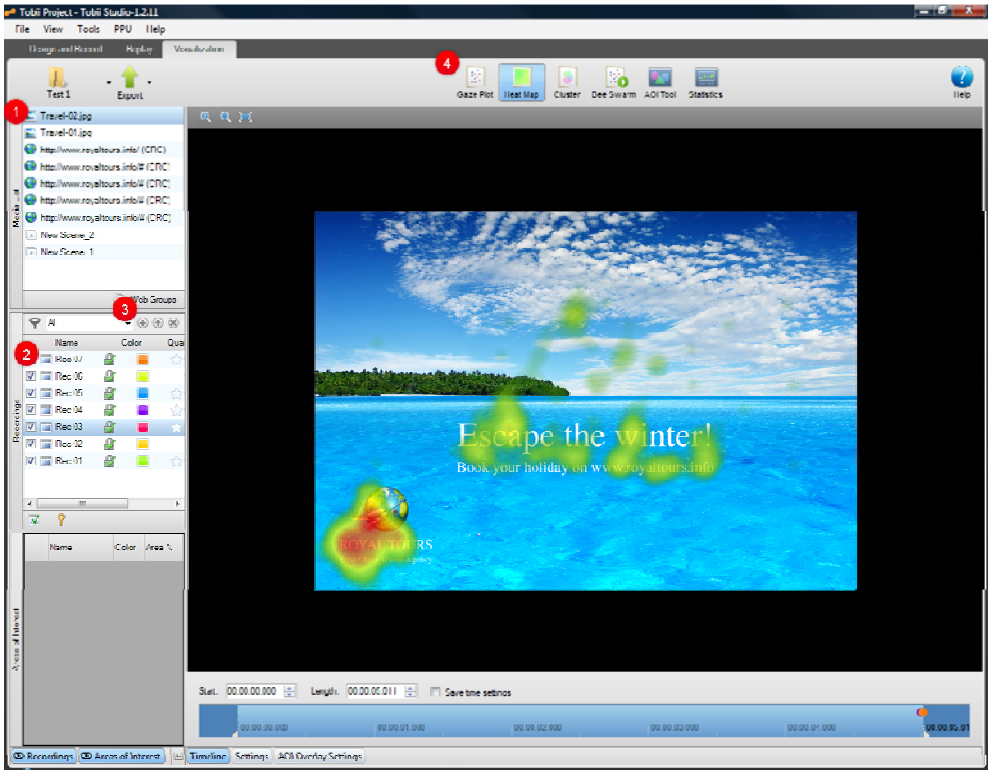
6. Visualization

The visualization view contains different tools for visualizing the gaze data in different ways. The different alternatives and the parts of the Visualization view are described in different chapters further down. To get familiar with this part of the software read the chapter, Visualizations - getting started, and the chapters Common tools and settings for the visualizations.

All visualization tools are not activated in all versions of Tobii Studio. If a tool is not activated the button will be grey. If you wish to activate a visualization tool you will need to upgrade to a license of Tobii Studio where the tool is included.

6.1 Getting Started with Visualizations

1. In the Visualization view, select the media to visualize data for.
2. Choose recording(s) to show data for. By default, all recordings in the test will be selected. Uncheck the box for recordings that should not be included.
3. If applicable, add a filter to display only a selection of participants in the visualization. An example could be to include gaze data only for women or for people over sixty.
4. Select a visualization tool:
    - To view a heat map, a gaze plot, or clusters, click Heat Map, Gaze Plot or Cluster. To display these types of visualizations for movies or screen recordings, the movie/screen recording first has to be divided into scenes in the Replay view, see the chapter, Scenes.
    - To visualize gaze data for a movie or a screen recording with several recordings simultaneously, click Bee Swarm.
    - To view and use the Statistics tool, areas of interest (AOIs) first have to be created. Click AOI Tool to create the regions and then click Statistics to view the statistics for the regions specified. To display Statistics for movies or screen recordings, the movie/screen recording first has to be divided into scenes in the Replay view.



6.2 Common tools and settings for the visualizations

All the visualizations share some tools and settings such as media list, recordings list and filtering.

Media List

All media that can be analyzed using the different kinds of visualization tools below will be shown in the media list. All images and web pages will be shown here. Movies and recordings with the screen recording tool have to be processed in the scene tool first. See the chapter, Scenes, for more details.

There are some special setting options for the web stimuli and how the pages are grouped for the analysis. Read more further down under web page grouping.

Recordings and Filtering

All the recordings shown in the recordings list can be included in the visualization and statistics, for example, Heat Map, Gaze Plot and Statistics.

One or a part of the recordings can be selected for the visualization by clicking the check box.

The participants included can be filtered by using the variables entered under the participant data in the setup.

Which filter to use is picked in the filter menu. The All filter will include and list all recordings. Uncheck the box/boxes next to the recordings that are not to be included in the visualization.

A filter is created by clicking the Create Recording Filter button. A filter can also be edited or deleted using the edit and delete filter buttons.

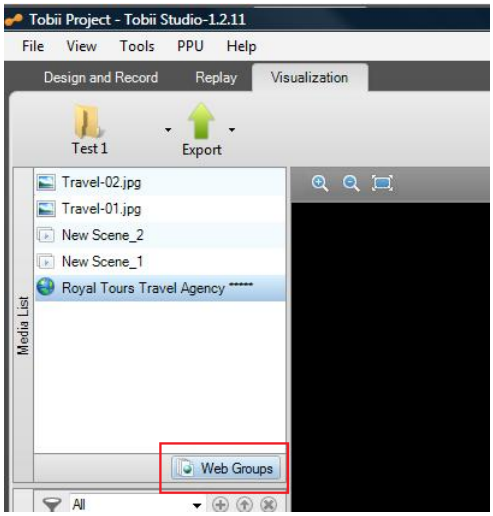
6.2.1 Web page grouping

When using the media web, pages can be grouped for the analysis.

In the *Web Group Tool* web pages can be grouped in different ways for analysis in the tools in the visualization view. Pages can be grouped by the predefined grouping modes URL, Size, ID and Name. They can also be grouped manually. When pages are grouped, eye gaze data for all pages will be shown on one page representing all the pages. This page is called Group Image. When grouping images make sure all pages in the group contain the same data, or that they have the same content for the areas that are to be analyzed.

How to group the pages can be found under Web Group Tool.

The get to the tool, click the *Web Groups* button found in the Media List in the Visualization view.



Once web groups are created, the groups will appear in the media list. Click on the group to show, for example, a heat map for the group.

Group Criteria

Web pages can be grouped based on:

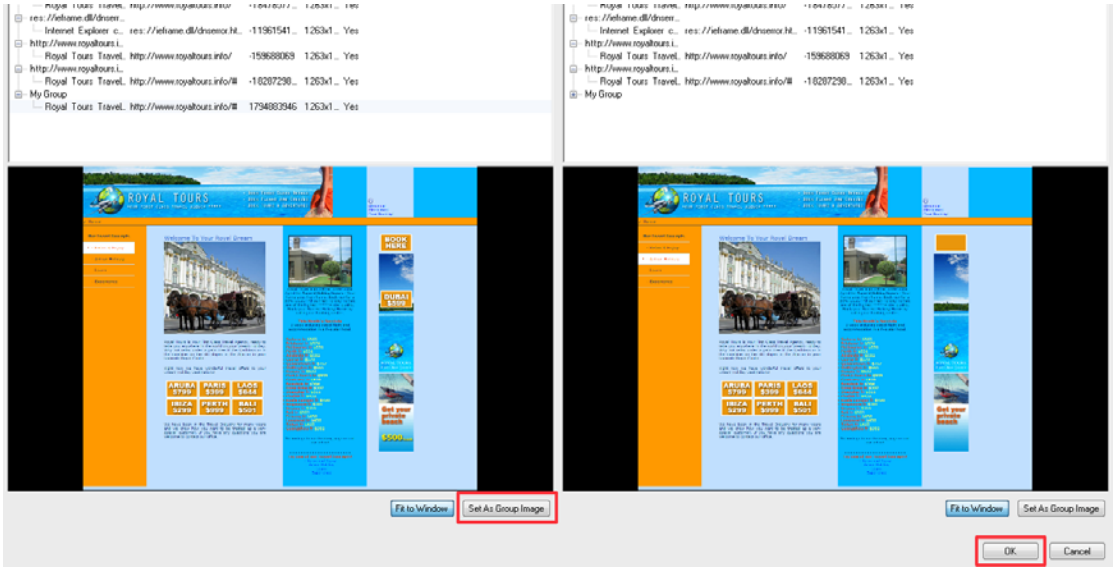
- ***URL:*** All frames with the same web address will be placed in the same group and gaze data for the frames summarized and shown on one frame. If a web page is displayed as several different pages, even though one web address is entered, in some cases one page per recording because of differences in page content such as an image, the pages can be grouped by URL. The background image/page is selected by selecting the image/page and clicking the *Set As Group Image* button.
- ***URL and Size:*** If frames have the same web address but different sizes the frames will be divided into different groups. Gaze data for all frames with the same web address and the same size will be summarized and shown on one frame. The background image/page is selected by selecting the image/page and clicking the Set As Group Image button.
- ***Name:*** Pages with the same name are grouped; pages with different URL can have the same name.

- ***Content:*** Pages are grouped by content ID. Pages with the same URL or Name might have different content IDs, selecting this grouping option will group pages that are identical; same content and url.
- ***Manual:*** Frames can be grouped manually. More information can be found below.

Group Image

A background image used in the visualizations for the web group has to be selected. This image will be shown in the heat map, etc., with data for all pages in the web group.

Select one image in the new group list by marking the page and clicking the *Set As Group Image* button.

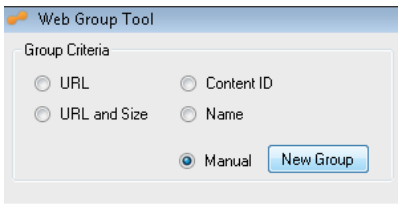


Manual Grouping

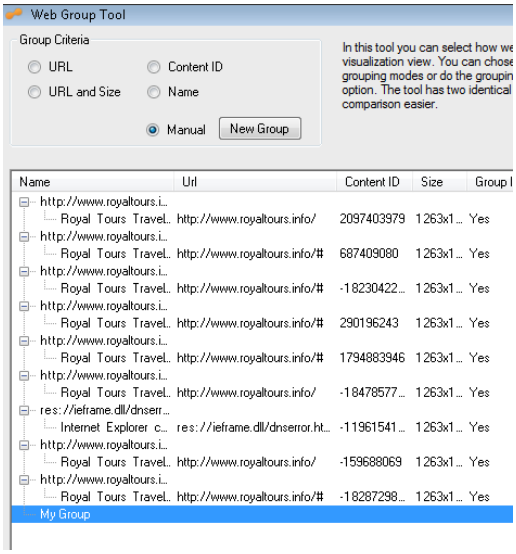
Web pages can be grouped using drag and drop. Two frames at a time can be shown. This makes it possible to compare two frames directly in the tool.

If Manual grouping is to be used follow the instructions below:

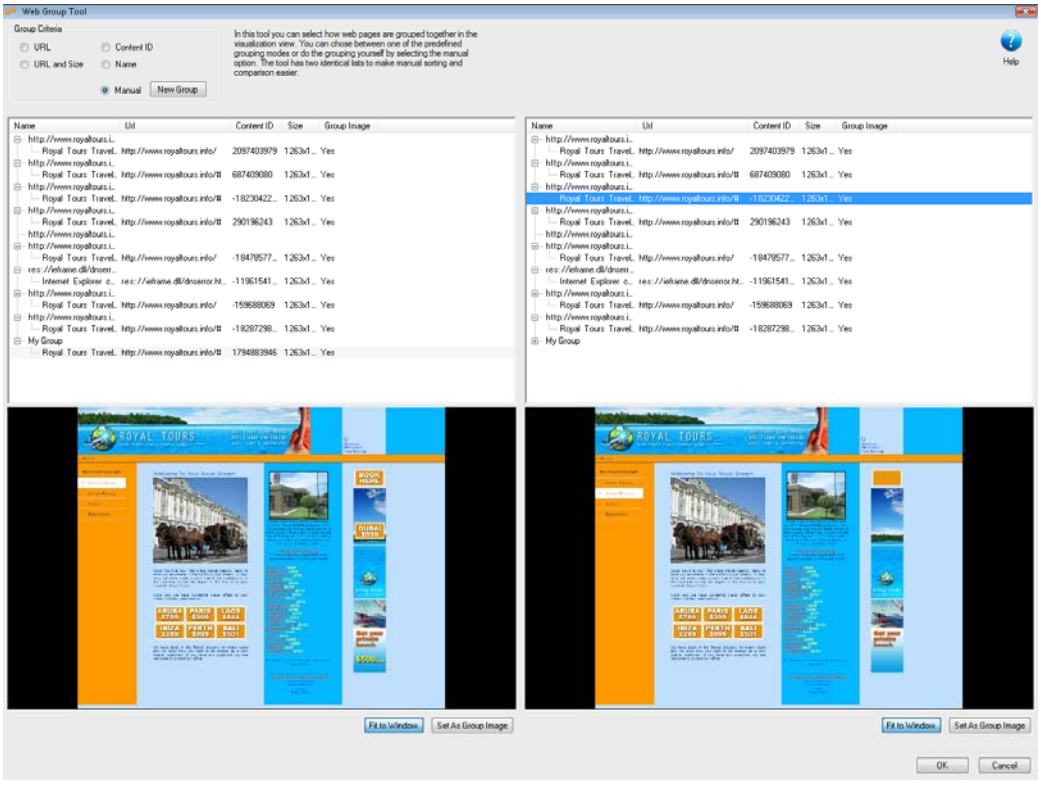
1. Click the *New Group button*.



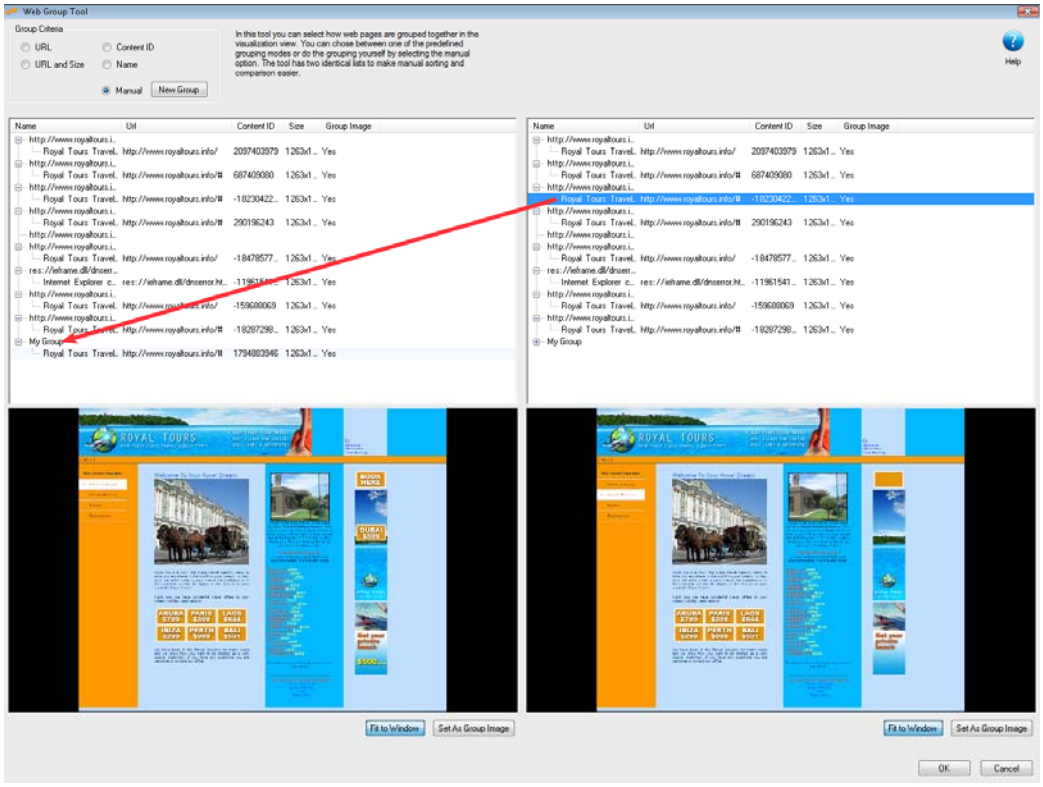
2. A new group will appear in the list of pages. Double-click on the name, New Group, to rename, enter optional name and press enter.



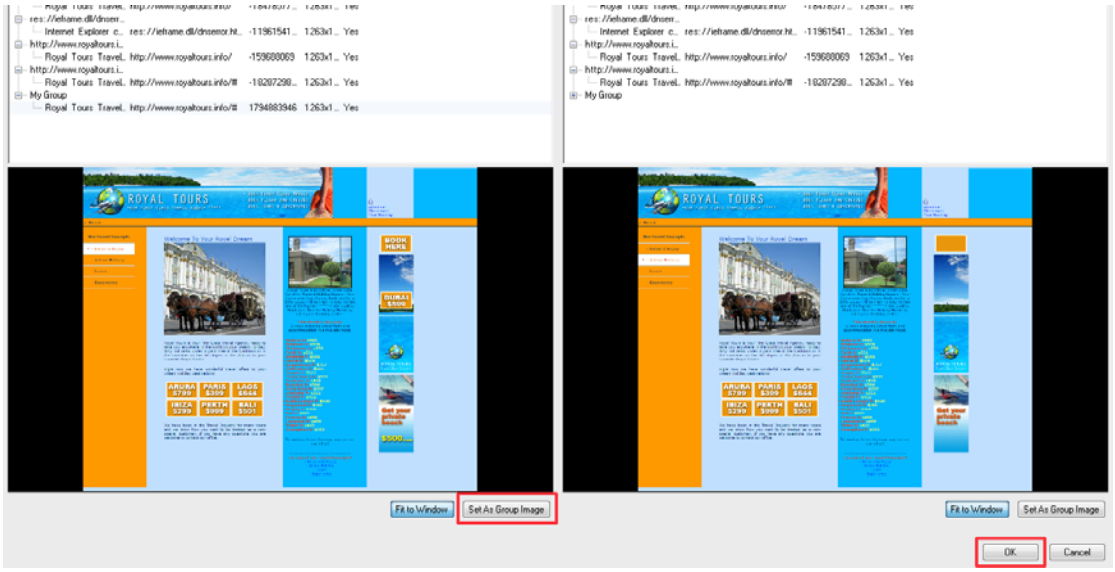
3. Click a link in one of the lists to see the content of the page. Two pages can be compared by marking one in each list. It can for instance be used to verify that the content of pages already added to the group and pages to be added should be in the same group.



4. Add a page to the new group by marking it and using drag-and-drop.



5. A background to show in the visualizations such as the Heat Map has to be selected. Gaze data for all pages will be shown on top of the page selected. Click OK when done.



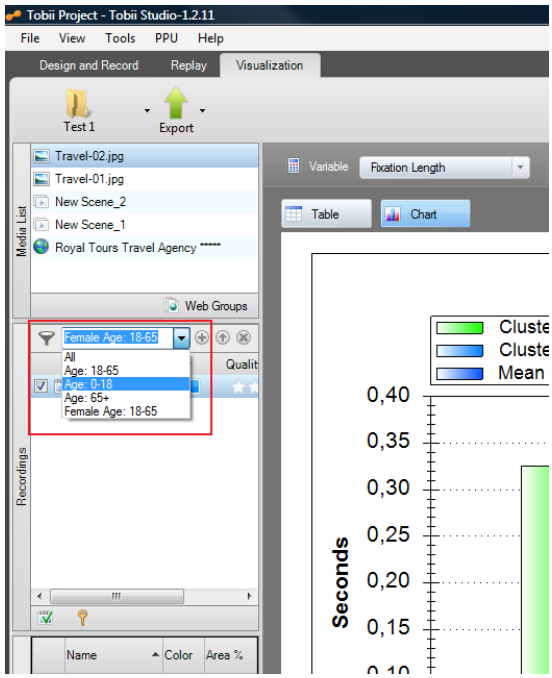
6. The new group can now be selected in the Media list in all the visualizations.

6.3 Filter

Filters based on participant data can be used to get statistics and visualizations for different participant groups. An example can be a heat map for all women, which can be compared to a heat map created for all men. The participant data is explained in a separate chapter, this chapter describes how to create and use filters.

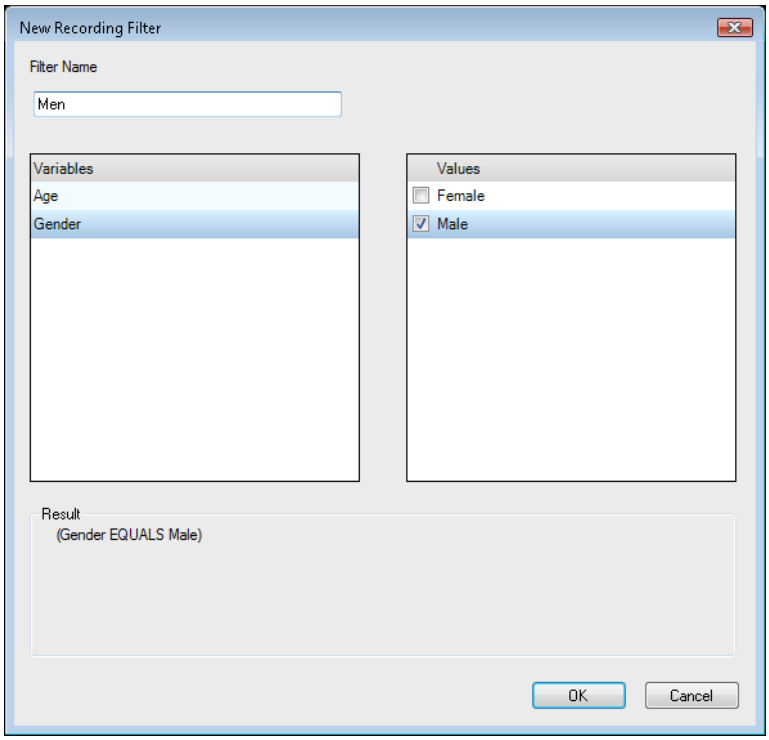
Filter list

Existing filters from a list can be selected for the visualization. The only default filter is the *All* filter containing all recordings.

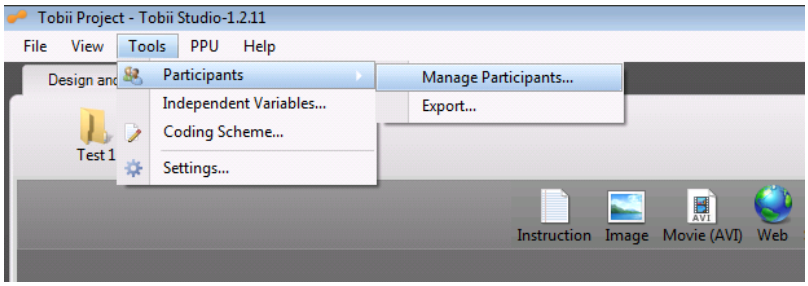


Create Recording Filter

To create a new filter, click the New Recording Filter button. Give the filter a name and choose the variables defining the filter. One example could be a filter filtering out all recordings for male participants. In this case the visualizations such as the heat maps and the gaze plot will only include data from all recordings where the participant is male. Several variables can be combined in one filter.

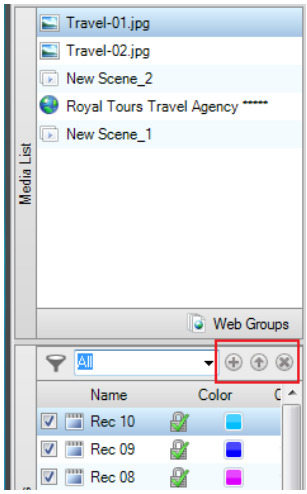


To set variables for a participant, go to the Tools menu. For more details on how to add variables and handle participants see the chapter participant data.



Edit or delete filter

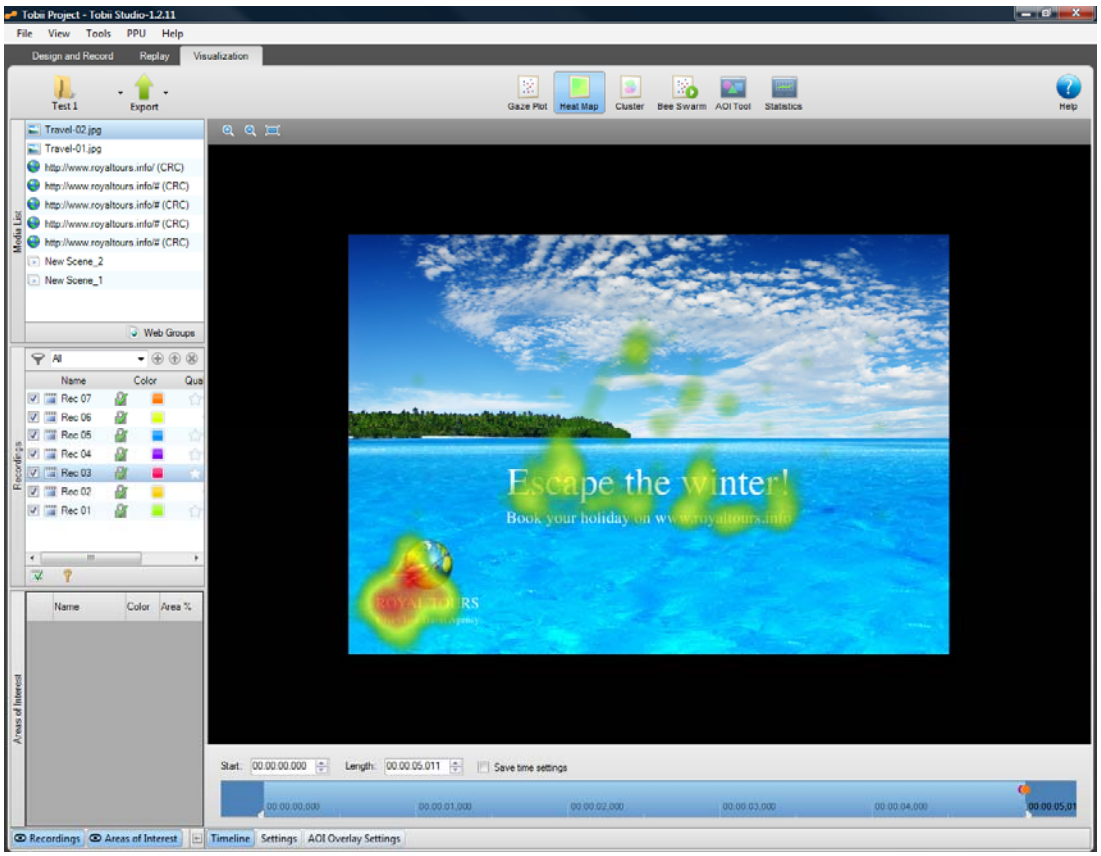
Filters can be edited or deleted using the edit or delete filter buttons. Select the filter to edit or delete in the drop down list and press the edit or delete button.



6.4 Heat Map

The Heat Map plot is a powerful way to visualize the gaze behavior of an entire group of recordings. To use this, select the recordings you want to include in the plot, and thereafter click on the Heat Map plot button Visualization view.

The Heat Map plot consists of the stimuli as background image and a Heat Map mask superimposed on top of this. The Heat Map mask consists of a transparent background, with highlighted areas where test persons have been looking.


Tobii Project - Tobii Studio-1.2.11
File View Tools PPU Help
Design and Record Replay Visualization
Test 1 Export
Gaze Plot Heat Map Cluster Bee Swarm AOI Tool Statistics Help
Travel-02.jpg
Travel-01.jpg
New Scene_2
New Scene_1
Web Groups
Rec 07 Rec 06 Rec 05 Rec 04 Rec 03 Rec 02 Rec 01
Escape the winter!
Book your holiday on www.royaltours.info
Start: 00.00.00.000 Length: 00.00.05.011 Save time settings
Recordings Areas of Interest Timeline Settings AOI Overlay Settings

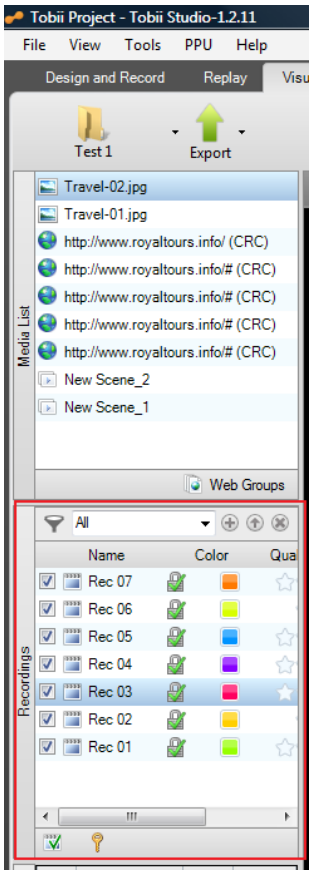
Showing a Heat Map

To get to the Heat Map tool, click on the Heat Map button in the Visualization view.

Select the media in the Media list for which a Heat Map should be shown. Note that the media has to be a still image. If the media is a screen recording or a movie (AVI), still images have to be defined before the Heat Map tool can be used. See more under scenes.

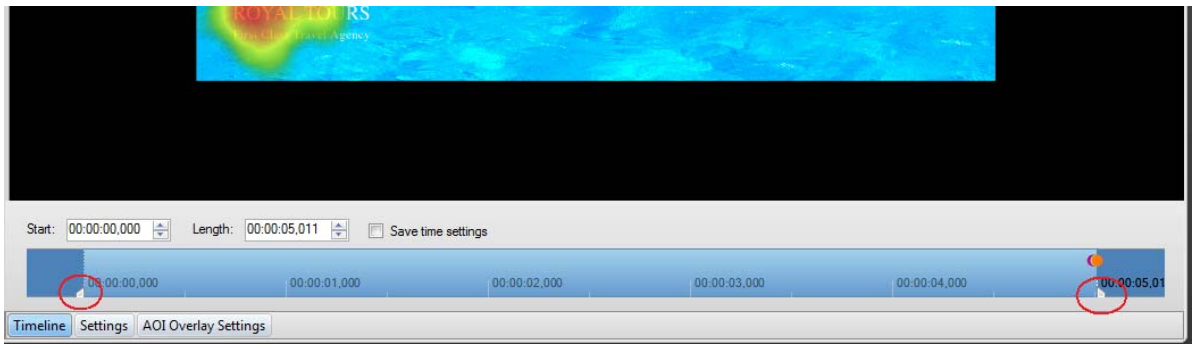
Data Selection

Gaze data for one or several recordings can be shown in the heat map. Select the recordings to show data for by checking the boxes in front of recordings to include or filter out recordings based on variables, read more under Filters.



Time segmentation of the Heat Maps

In some cases it is of interest to create a Heat Map for only a part of the time that the image was shown during recording. The timeline at the bottom of the Heat Map view shows the time segments chosen for the Heat Map. Markers on the timeline indicate the end of the different recordings. The color of the dot indicates which recording was ended. The color corresponds to the color shown next to the recording in the recordings list. By dragging the end markers on the timeline, the time segment to include in the Heat Map can be changed. Note that by making the time segment smaller some recordings might be excluded from the calculations altogether.



Save image

To save, right-click on the Heat Map image and select *Save Image* to save the image to file. It is also possible to save only the heat map layer without the background image shown to the test participants. This alternative is also found in the menu appearing when right-clicking on the heat map.

A legend for the heat map is shown on the heat map image. It is possible to select if and where to place this on the saved image. This setting will appear after selecting to save the image. How to change the settings for the heat map is described below.

Heat Map Settings

Fixation data style

There are three types of Heat Map styles:

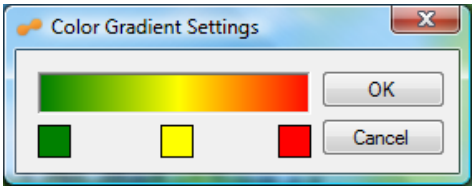
1. ***Count*:** The plot shows the accumulated number of fixations from all the selected test persons. This means that this plot only shows where people have looked and not for how long. That means that a 2000 ms fixation will look the same as a 100 ms fixation.
2. ***Absolute Duration*:** This plot shows how long the selected test persons have looked at the different areas in the image. This means a 2000 ms fixation will be 20 times higher (in color value) than a 100 ms fixation.
3. ***Relative Duration*:** The sum of the individual fixation lengths relative to the total fixation time on the image for each recording; if in recording A, the subject looked at the image for 10 seconds and at a specific object for 3 seconds and in recording B, the subject looked at the image for 10 minutes and at the specific object for 3 minutes. In this kind of Heat Map the data from recording A and recording B will have the same weight.

Display settings

Under the display settings the definition for the maximum value, shown in red in the heat map, is set. What to set here depends on what is selected under Fixation data style

- If Count is selected, the minimum number of fixations represented by the color furthest to the right in the color bar (red by default) in the heat map is set.
- If Absolute duration or Relative duration is selected the minimum fixation length represented by the color furthest to the right in the color gradient bar (red by default) in the heat map, is set.

The color scheme for the heat map can be changed by double clicking on the color gradient bar. The Color Gradient Settings window will appear. Double click on the color boxes below the color line and select a color from the color palette that appears.



It is possible to show the heat map in different styles. This setting is found under the Display settings in the Settings menu. The default style is called Heat map. Simply click one of the other styles to change the style. The style Gaze opacity shows the parts of the media with the most or longest fixations clearly and shades the rest of the media.

Opacity

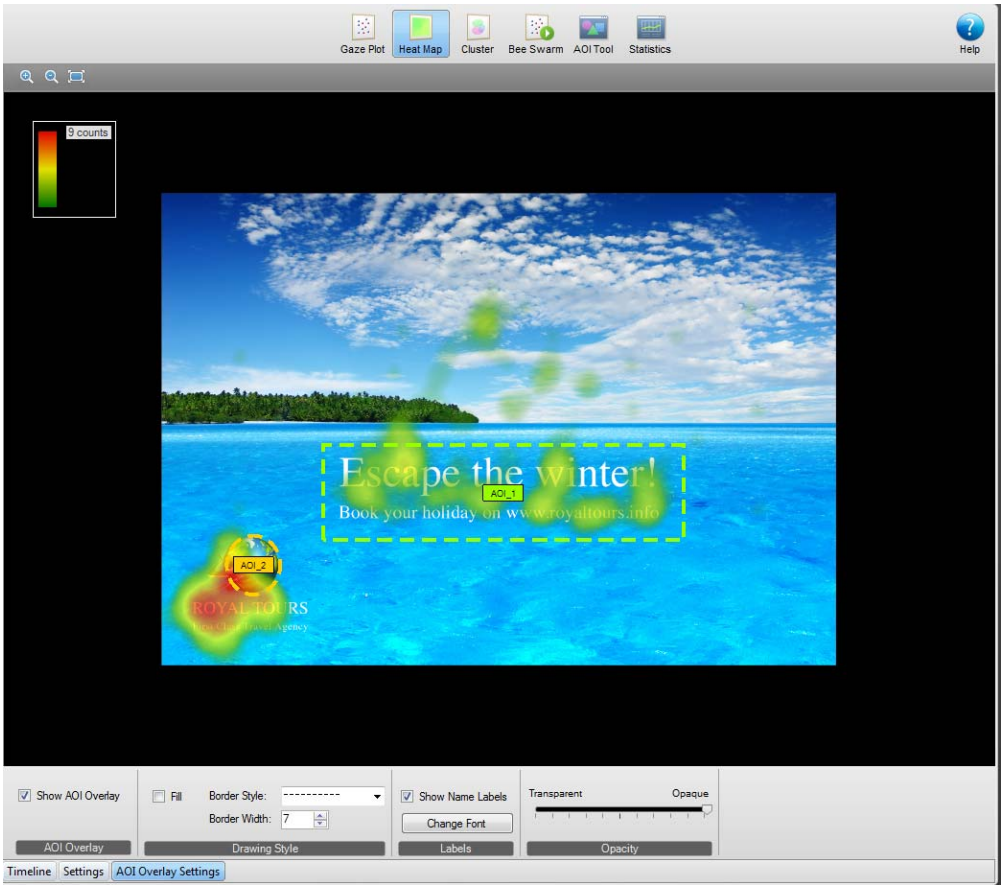
In the Settings menu the opacity, or transparency, of the Heat Map Layer can be changed. To hide less of the media background, make it more transparent.

Mouse Clicks

If the participant is using a mouse during the test it might be interesting to see the mouse clicks in the heat map image. To show or hide the mouse clicks on the Heat Map, click the check box, *Show Clicks,* under Mouse Clicks in the Settings menu.

AOI Overlay

The Areas Of Interest defined in the AOI tool can be shown in the Heat Map.



Settings such as color and opacity can be found at the bottom of the Heat Map view, under AOI Overlay settings. More information on the settings is found in the chapter, AOI under AOI Settings.

Definition Heat Map

Data used to create heat maps

In the heat map tool, the image is either based on fixation data or raw data. In both cases the input data is a list of data items with a time stamp, duration, and a spatial location (x and y coordinates). In the case of raw data, each item corresponds to raw gaze point from the eye tracker and since the speed is 60 Hz (50 or 120 Hz for some products), the duration of each item becomes 16-17 ms (for 60 Hz system). In the fixation case, the data from the eye tracker is grouped into fixations, where the duration

depends on how long the test person looked at a specific point (this is further described in the manual). This means that the input data typically looks something like this:

Fixation: 1 Start: 132 ms Duration: 245 ms Location: (415,711)

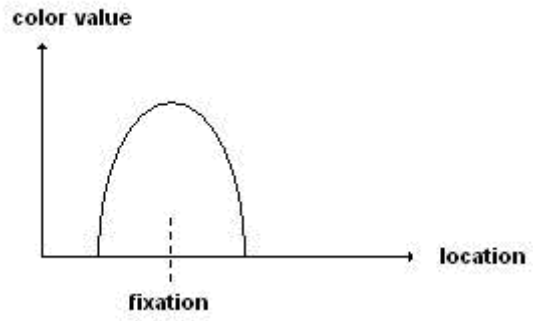
Fixation: 2 Start: 264 ms Duration: 735 ms Location: (711,491)

Fixation: 3 Start: 591 ms Duration: 101 ms Location: (301,10)

.....

Plotting the heat map

The next step is to construct a heat map from this data. What we want to do is to assign a color value to each point in the image. This is done by going through the fixations one by one and adding values to the color map at the position indicated by the fixation location. One possible way to do this could be to add some value just to the specified position (pixel). However, this would result in a rather useless image, with only a couple of small colored dots. What we do instead is add values to all the points within a certain distance to the fixation location. To get a nice plot we let the values that we add decrease as we move away from the point. The principle is illustrated by the simplified picture below.



This method reflects the fact that the human eye has the highest visual acuity at the so-called fovea and that this acuity decreases as we move away from this spot on the retina. This means that when we focus our eyesight on a word in a text, we are able to read the word and its immediate neighbors, but not words a few centimeters away.

6.5 Gaze Plot

The Gaze Plot displays a static view of the gaze data for each image of the stimuli and is a useful tool when visualizing scan paths. Each fixation is illustrated with a dot where the radius represents the length of the fixation. The order of the fixations is shown with a number in each fixation dot, note that the numbers are per recording.

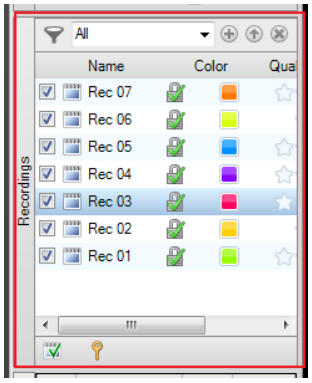
Showing a Gaze Plot

To get to the Gaze Plot, click on the Gaze Plot button in the Visualization view.

Select the media in the Media list for which a Gaze Plot should be shown. Note that the media has to be a still image. If the media is a screen recording or a movie (AVI), still images have to be defined before a Gaze Plot can be drawn. See more under scenes.

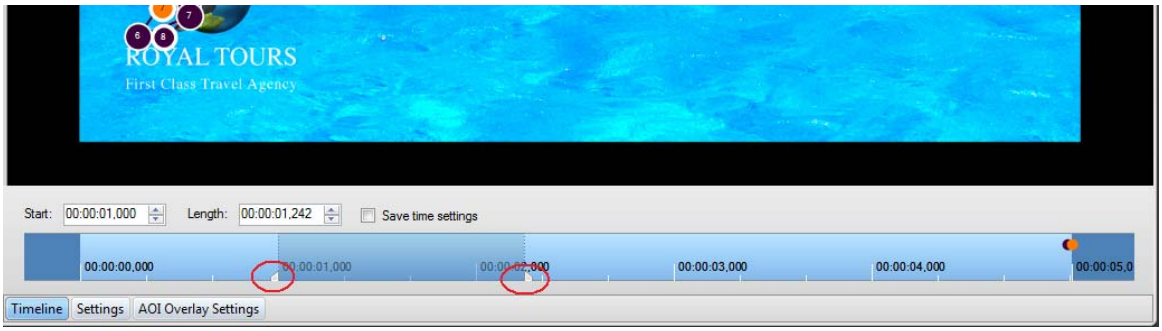
Data Selection

1. Start by selecting the image for which the gaze data is to be shown.
2. Gaze data for one or several recordings can be shown in the gaze plot. Select the recording(s) to show data for by checking the boxes in front of recordings to include or filter out recordings based on variables, read more under Filters.



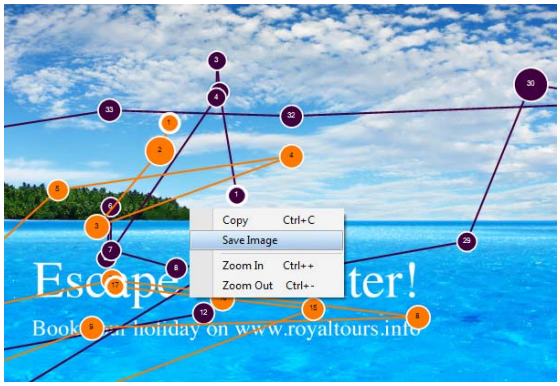
Time segmentation of the Gaze Plots

In some cases it is of interest to create a Gaze Plot based on only a smaller time segment than the image that was shown during recording. The timeline at the bottom of the Gaze Plot view shows the time segment chosen for the Gaze Plot. The color of the dot indicates which recording was ended. The color corresponds to the color shown next to the recording in the recordings list. Markers on the timeline indicate the end of the different recordings. By dragging the end markers on the timeline, the time segment to include in the Gaze Plot can be changed. Note that by making the time segment smaller some recordings might be excluded from the calculations altogether.



Save image

To save, right-click on the Heat Map image and select *Save Image* to save the image to file.

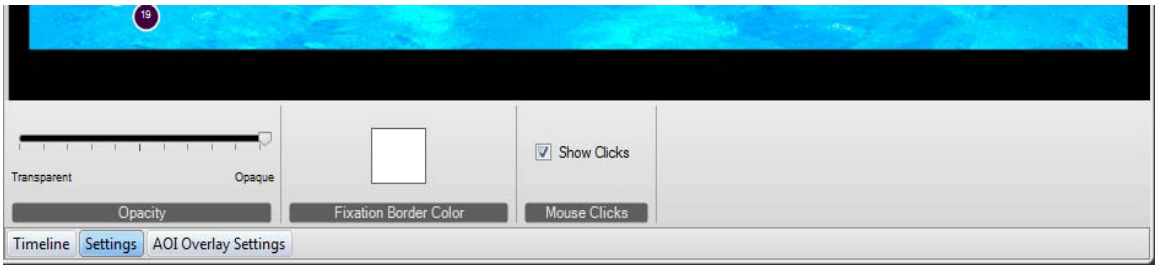


Changing colors of the fixation points

Double click on the color icon next to the recording the color is to be changed for. A color table will appear. Select the color and click OK.

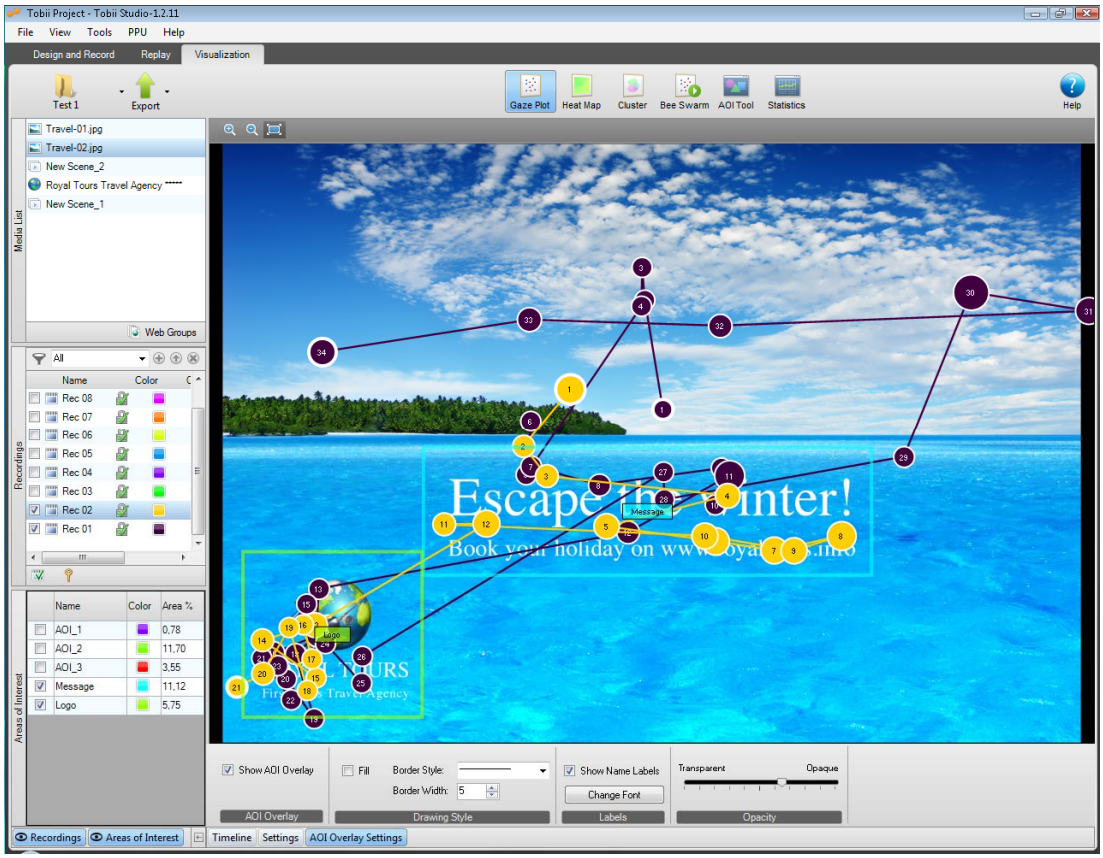
Settings

The transparency of the gaze trail and the fixation border color can be altered. The option of whether to show the mouse clicks can also be found under the settings.



AOI Overlay

The Areas Of Interest defined in the AOI tool can be shown in the Gaze Plot.

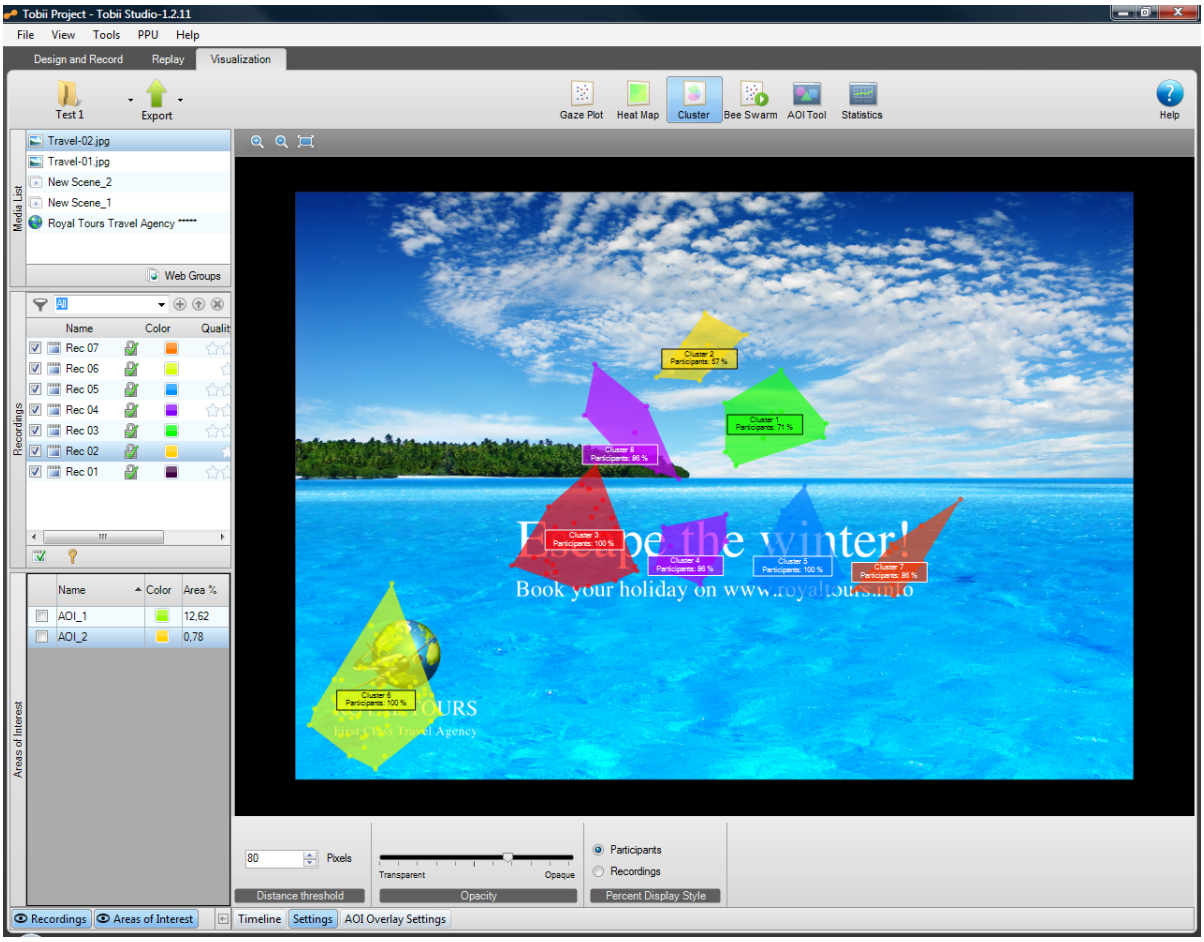


Settings such as color and opacity can be found at the bottom of the Heat Map view, under AOI Overlay settings. More information on the settings is found in the chapter, AOI under AOI Settings.

6.6 Cluster

Clustering of fixation data can be seen as an automatic generation of Areas-of-Interest. Clustering of fixation data is done by finding an area with a high concentration of fixation points.

The maximum distance between fixations to include in a cluster can be set as a distance threshold. The distance threshold can be changed under Settings in the Cluster view to create smaller or larger cluster areas.



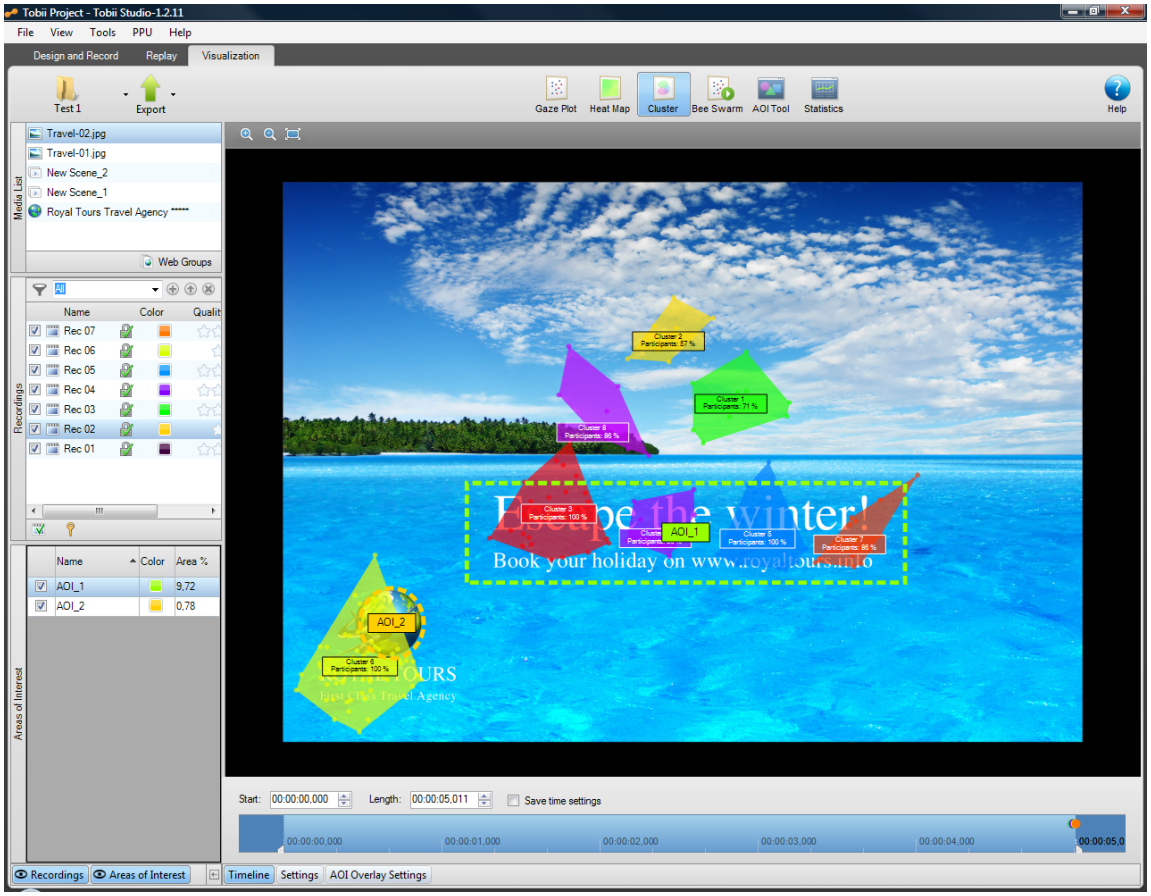
Showing Clusters for a media

To get to the Cluster view, click on the Cluster button in the Visualization view.

Select the media in the Media list for which clusters should be shown. Note that the media has to be a still image. If the media is a screen recording or a movie (AVI), still images have to be defined before clusters can be drawn. See more under scenes.

AOI Overlay

The Areas Of Interest defined in the AOI tool can be shown in the Cluster view.



AOI Overlay Settings

Settings such as color and opacity can be found at the bottom of the Heat Map view, under AOI Overlay settings. More information on the settings is found in the chapter, AOI under AOI Settings.

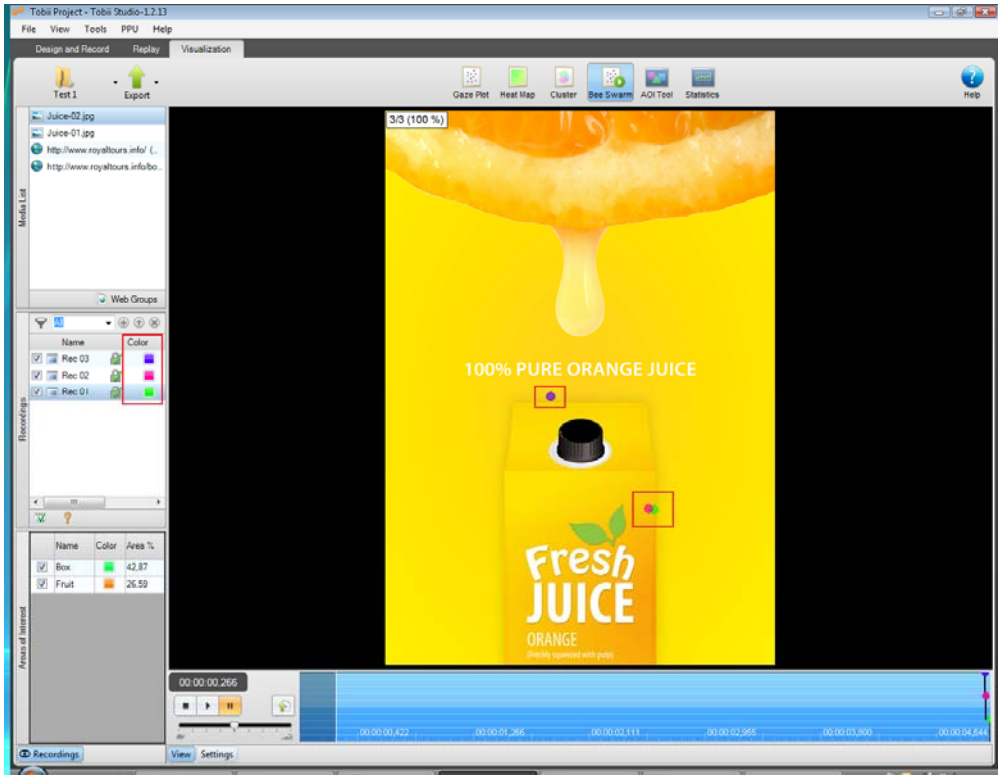
Using the Clusters for statistical analysis

Clusters or Regions-Of-Interest found in the Cluster tool have to be exported to the AOI tool to be used for the statistical analysis.

All or any cluster(s) can be removed or edited in the AOI tool. Shape, name and location of the image can be changed just as for the AOIs (Areas-of-Interest)

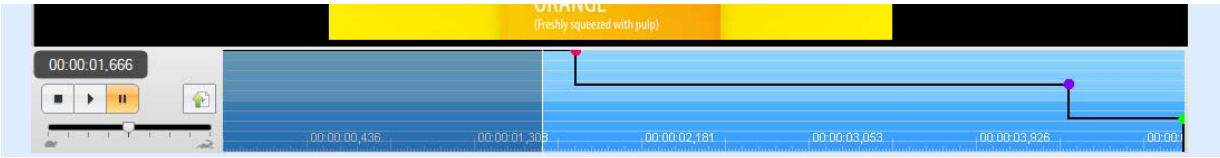
6.7 Bee Swarm

The Bee Swarm can be seen as a replay of more than one recording or test participant. The gaze overlay of all participants is displayed on top of selected media and is played in real time. The fixation of each participant is illustrated with a color coded dot.



Drop-out graph

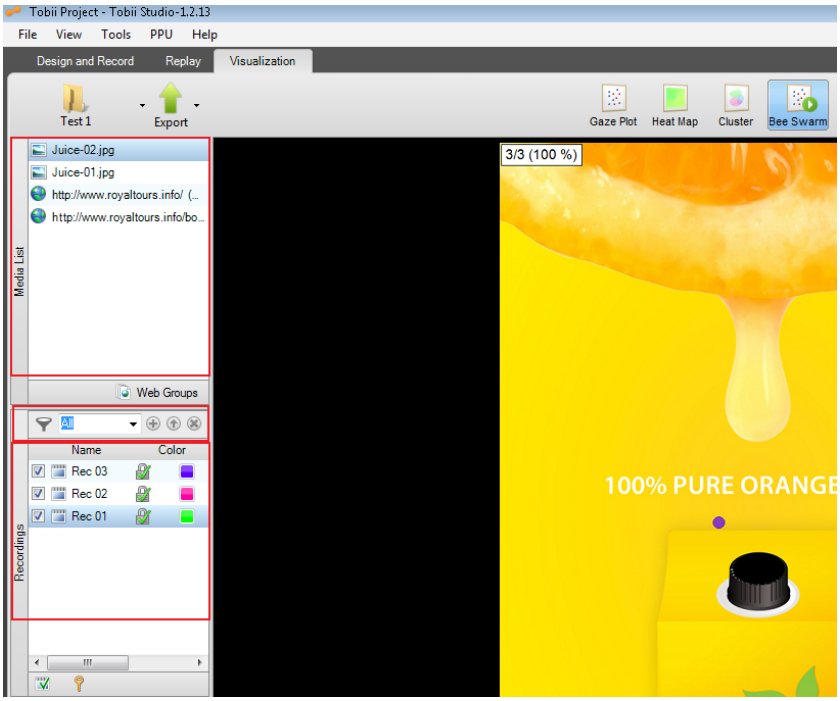
On the timeline below the Bee Swarm replay the total gaze time of all participants is visualized with a drop-out graph. In the graph a color dot representing each participant is shown at the time the participant stopped viewing the media. The color corresponding to each recording can be found next to the recording in the recordings list.



Data Selection

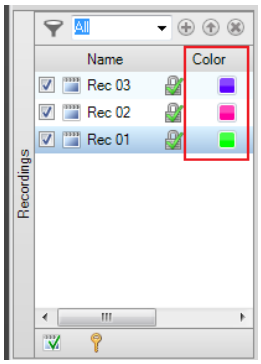
Start by selecting the media for which the Bee Swarm is to be shown. Gaze data for all the recordings selected in the Recordings list will be shown as fixation dots on the image in the replay of the media.

Recordings are selected by checking the boxes in front of the recordings or by using a variable filter, read more under Filters.

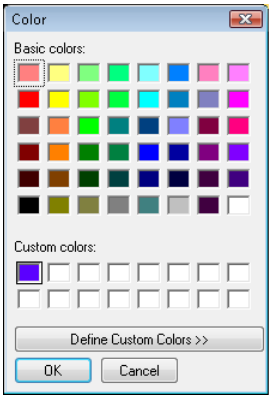


Changing colors of the recording dots for the graph

1. Double click on the color icon next to the recording the color is to be changed for. A color tablet will appear.



2. Select color and click OK.



Settings

It is also possible to set one color for all dots. This is done at the bottom of the Bee Swarm view under *Settings -> Overlay -> Use Custom Color*. To go back to show different colors for different recordings select *Use Recording Colors*. See image under Settings below.

The transparency of the dots (Opacity) and the fixation dot size can be altered in the settings menu. The dot size setting tells how the dot is drawn in the bee swarm.

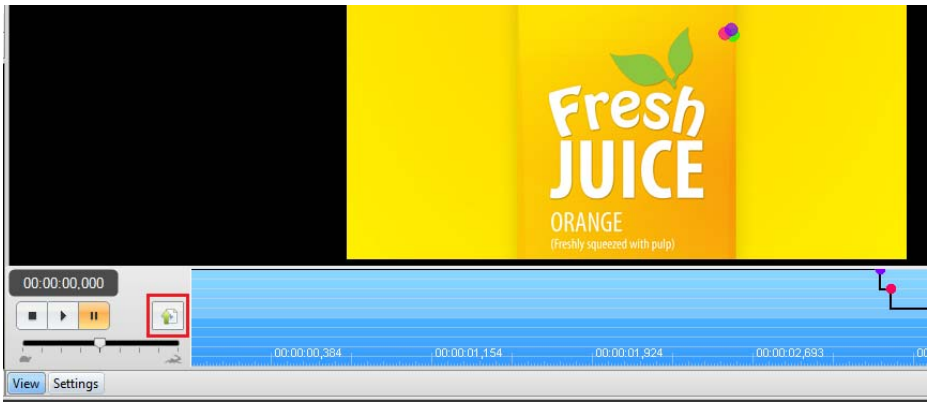
It is possible to use the same color for all recordings as well, read more under changing colors above.

A label telling how many participants that have looked at the image/movie at the time shown is shown in the top left corner of the Bee Swarm. It is possible to select if this label should be shown or not under Settings -> Overlay -> Draw Activity Label

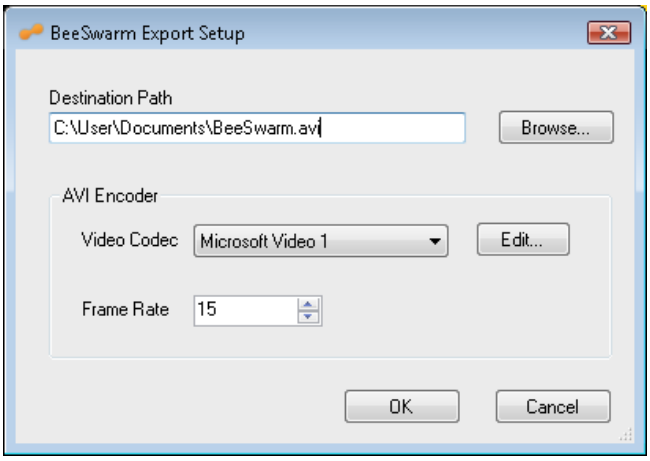
Export as Movie

Bee Swarms can be exported as movies, AVIs. These can be used in presentations etc.

1. Click the export button at the bottom of the Bee Swarm view

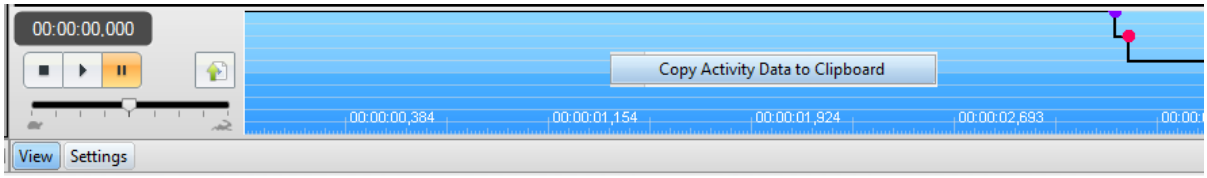


2. Browse to select a folder where the movie should be saved. For recommendation on codecs see the system recommendations. Press OK when done. Open the folder selected as destination path to view the exported Bee Swarm.



Export Data

The activity data; recordings name and length can be exported to the clipboard to be pasted in other programs such as Excel and PowerPoint. Right click on the timeline under the Bee Swarm to export the activity data.

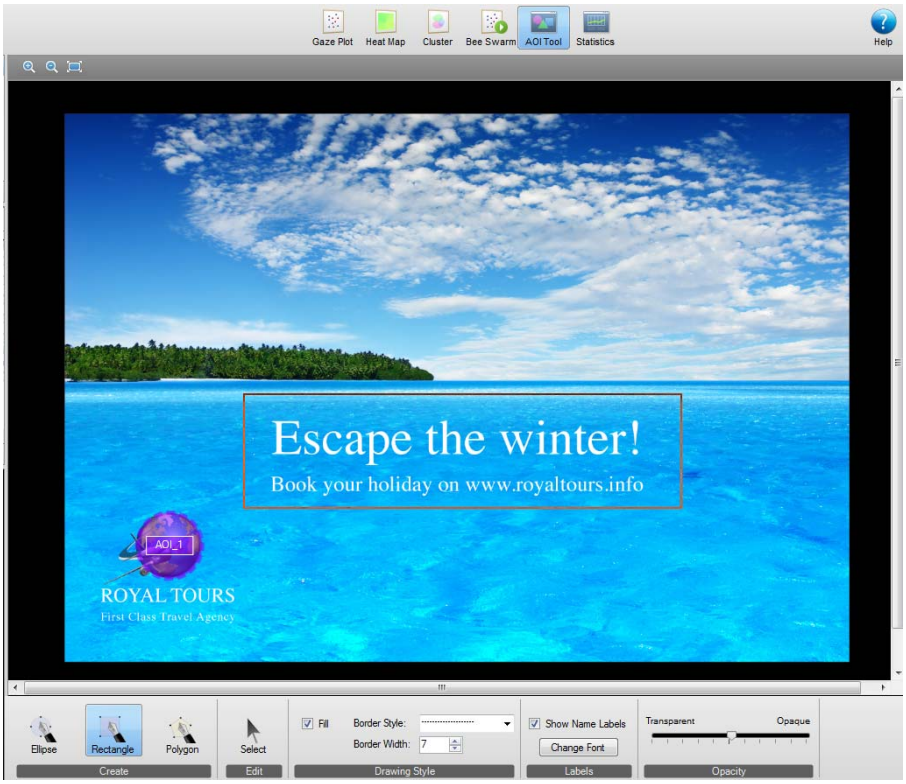


6.8 Area of Interest

A very useful tool for quantifying gaze data on a higher level is to use Area Of Interest (AOI) analysis. When using AOI analysis, you can define areas of interest within your stimuli. Instead of interpreting your data based on the direct gaze coordinates of the test subjects, you base the analysis on the frequency, time, etc., that the subject(s) have been looking within the areas of interest. This is applicable to a range of different analysis applications, for instance, psychology studies and web usability studies.

The AOI data, such as the fixation count or fixation length in one specific area is visualized in the statistics tool.

Click on the *AOI Tool button* in the visualization view to open the AOI tool. You can create any number of AOIs in any frame of your stimuli. A frame can either be a single image (for image media), an image of each frame visited during web browsing (for web media) or a static image representing part of an AVI or screen recording (for screen recording and movie media).



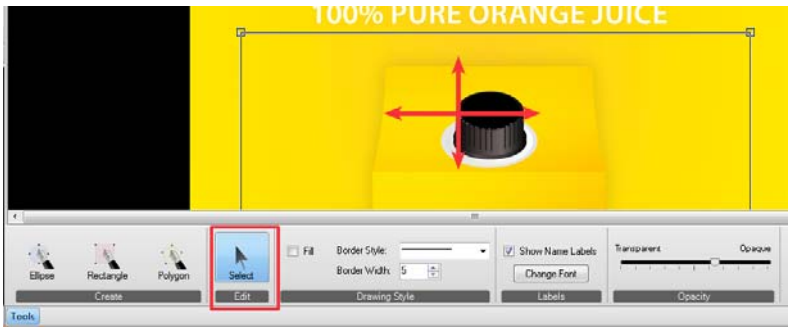
Defining a new AOI

1. Select the media for which media AOIs should be defined. Note that the media has to be a still image. If the media is a screen recording or a movie (AVI), still images have to be defined before the AOI tool can be used. See more under scenes.
2. Add a new AOI by clicking on the desired shape under *Create*.
3. Place the AOI on the image by clicking where the AOI should be and draw the AOI.

Edit AOI

Change position

Click the edit button to change the position or shape of the AOIs. All AOIs can be moved around by clicking on the AOI with the mouse and holding the button down.



Change size

The AOI can be resized by moving its corner points.

Change order

To change the order of the Area Of Interest, right-click on an AOI and select if it should be in front of the other AOIs or vice versa.

Rename or delete an AOI

1. Select Edit
2. Right-click on the AOI to see the image menu
3. Select Rename or Delete (An AOI can also be deleted by pressing the delete button on the keyboard) When renaming, simply enter the new name and press OK.

Zoom

It is possible to zoom in on the AOI or fit it to the screen. Press the buttons over the Area Of Interest Image or right-click anywhere on the image to get the image menu.

Save or Export the AOI Image

To save an image with the Area Of Interest on top, right-click on the image and select *Save Image* from the image menu. See the picture below. The export is also found in the image menu. Browse the folder where the image should be saved and select a name for the image.

Copy AOI

If the same AOI is to be used on several images, copy the AOI on one image and insert into the other images that should have the same AOI.

To copy AOI from one image to another;

1. Select the image from which an AOI should be copied

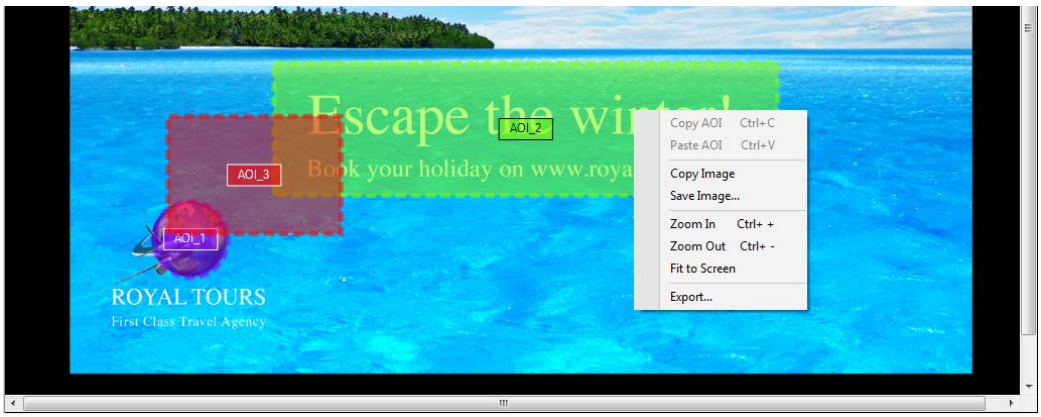
2. Click the Edit button.

3. Right-click on the AOI and select *Copy AOI*. (Or use the keyboard shortcut Ctrl+C)

4. Select the image where the AOI should be inserted/copied to.

5. Select Edit.

6. Right hand click on the image and select *Paste AOI*. (The keyboard shortcut Ctrl+V can also be used)



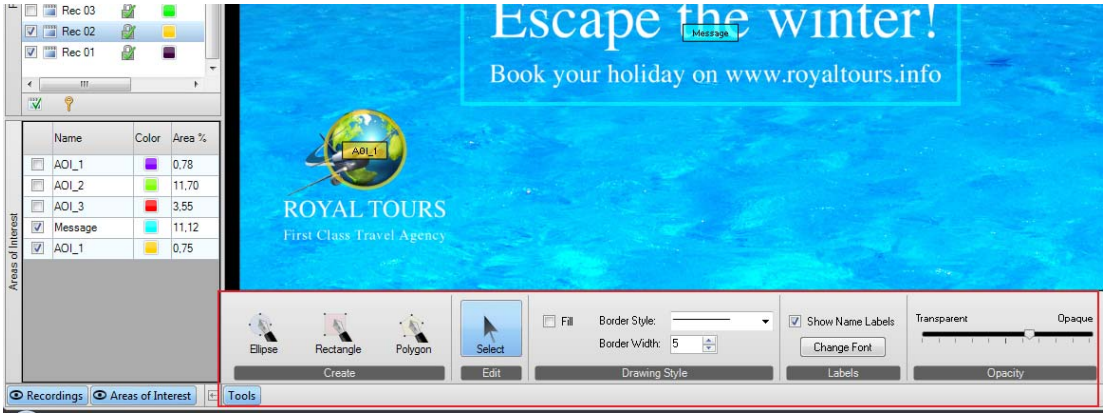
Export AOI Data

AOI Data can be exported and used for analysis in external software. The AOI Export contains the screen coordinates of the AOIs. For Rectangles and Polygons the coordinates are the corners, for Ellipses it is points along the outer line of the ellipse.

To export right click in the AOI and select Export…, see image above. Select folder to save the data in. A text file will be created, which can be opened from the folder it was exported to.

AOI Settings

Settings such as color and opacity can be found at the bottom of the AOI view, under Tools.



Drawing Style

An AOI can be shown as a filled area or as an outlined area with different border styles. By default, the AOIs will be shown as filled areas. Make sure the box, Fill, is not checked if only the border should be shown.

Labels

If the option, Show Name Labels, is checked, the names of the AOIs will be shown on the AOIs.

Opacity

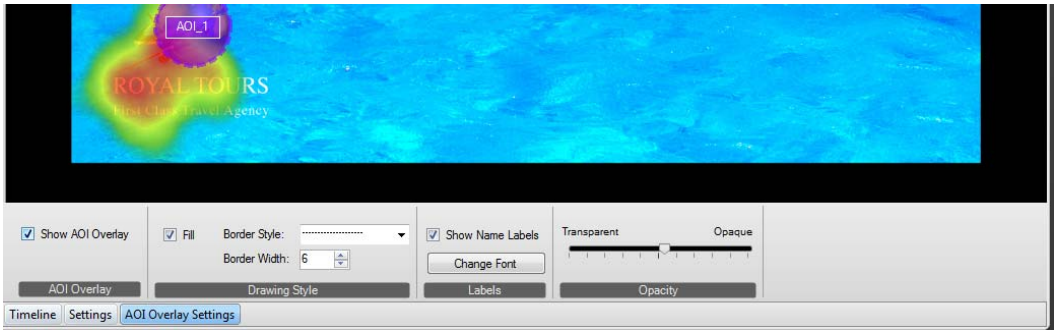
The opacity for the Area Of Interest can be increased or decreased. Make them more transparent in order to show more of the background through the areas.

AOI Overlay in other visualization tools

It is possible to see the AOI (Areas of Interest) in the Gaze Plot, Heat Map and Cluster.

It can be used to see if the Areas Of Interest created cover the areas where there are many fixations.

To show the AOI Overlay, click the *AOI Overlay Settings* tab at the bottom of each visualization view. The settings are the same as for the AOI, see AOI Settings above.



6.9 Statistics

The statistics in the statistics tool are based on Areas Of Interest and the data in these areas. To define Area Of Interest (AOI) go to the AOI tool found in the visualization view.

Create a Chart or Table

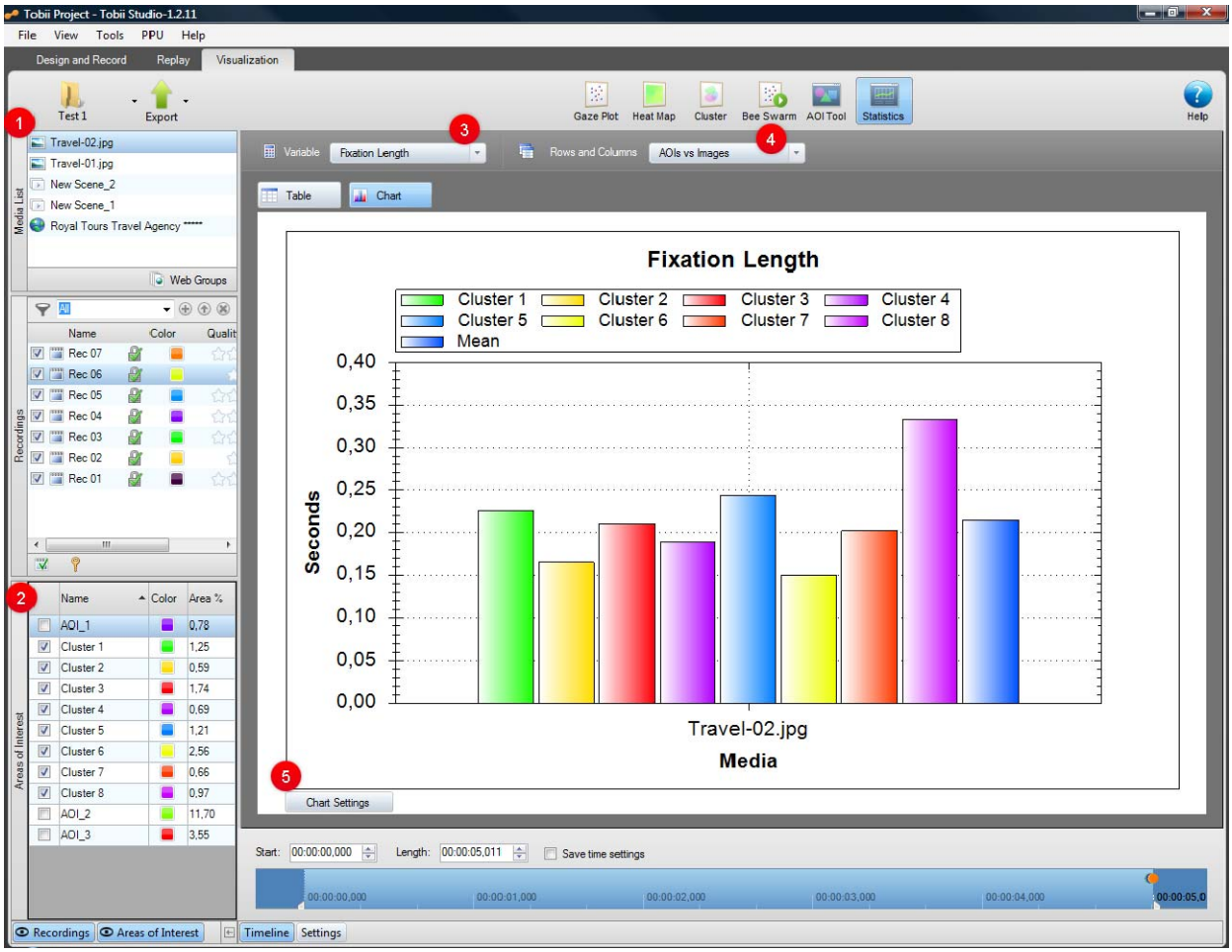
1. Select an image in the media list.

2. Select Recordings to include in the statistics either by manually checking the box in front of recordings to include or by using a filter. By using a filter, recordings and data for, for example, males or teenagers can be filtered out. Select the default filter, All, to include all recordings. Read more about the filtering under Filters.

3. Select a *Variable* in the drop down menu. Examples are fixation count. See more under Statistics Variables.

4. Select how the data should be visualized for the chart or table under Rows and Columns. See more under *Rows and Columns*.

5. For the chart, select how the data should be calculated. In other words if the mean, max value, etc., are going to be shown in the chart. This is done under the *Chart Settings*. For the table the selection is done under *Cell Values*.



Chart

In the chart, the data selected under *Variable* will be shown as bars. Data for all selected recordings and all AOIs will be included. Data for the images, recordings and AOIs can be shown in different ways by selecting different viewing options under *Rows and Columns*. Select how the data should be calculated under the *Summary Settings*.

Select the Chart view by clicking the Chart tab in the Statistics view.

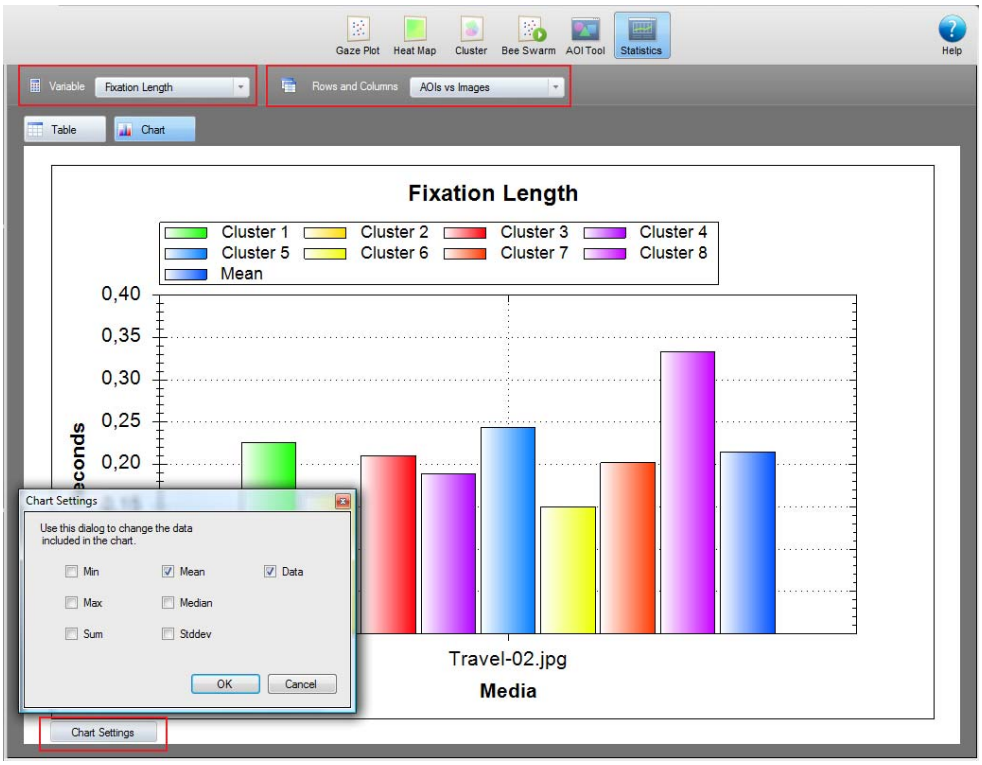


Chart Settings

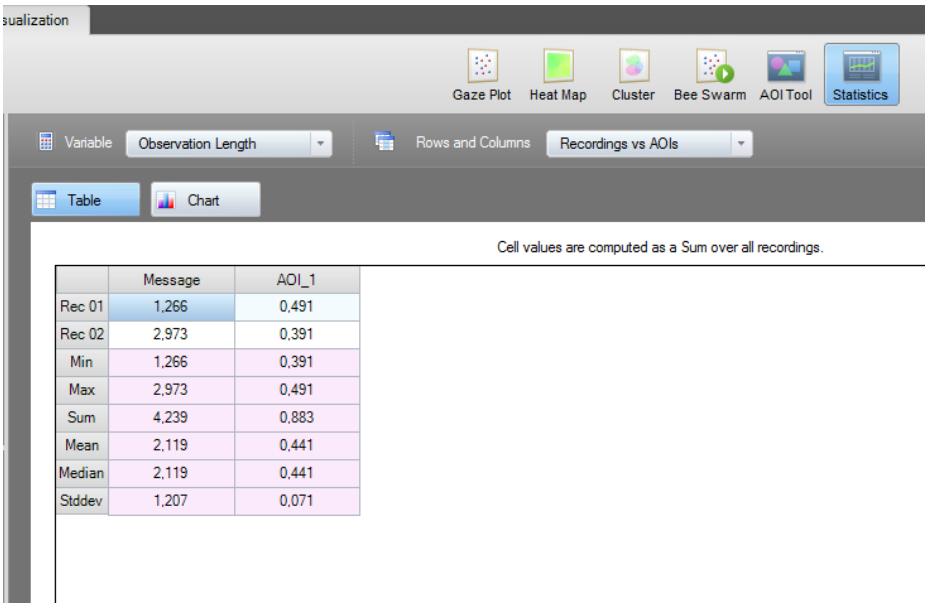
The chart settings such as mean or max value are found under the Chart Settings button in the chart view. See image above. The different options for calculations of the chart statistics are found here. One or several options can be shown at the same time. The options are:

- Min
- Max
- Sum
- Mean
- Median
- Stddev
- Data

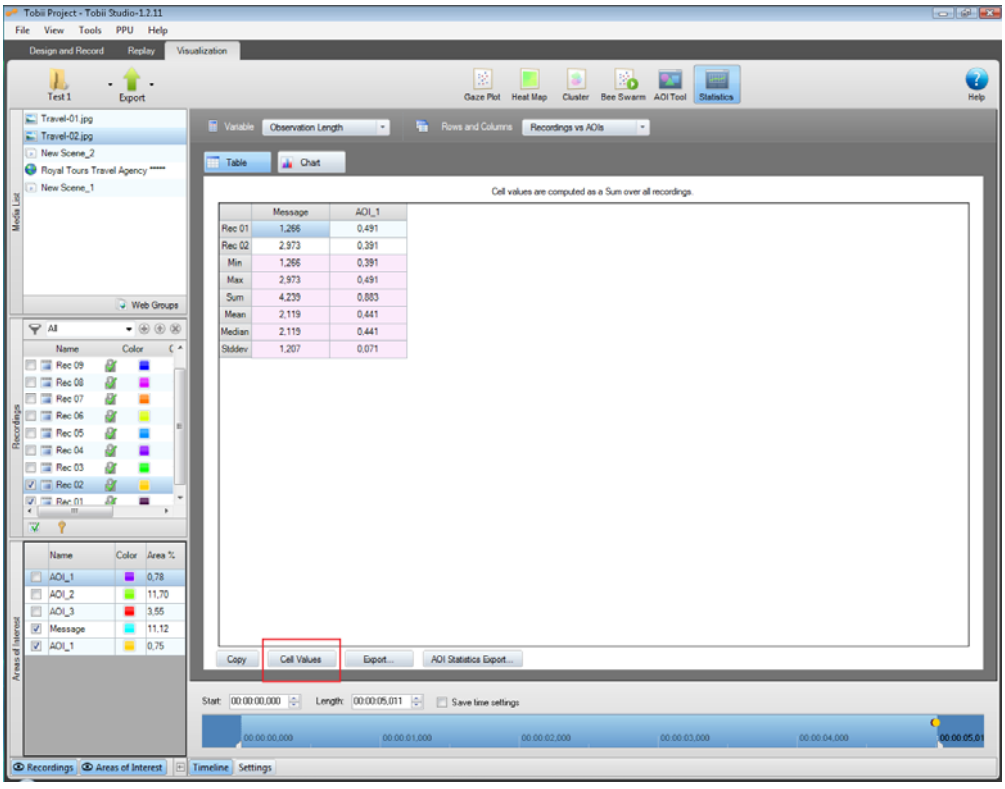
Table

In the table, the data selected under *Variable* will be listed. Data for all selected recordings and all AOIs will be included. Data for the images, recordings and AOIs can be shown in different ways by selecting different viewing options under *Rows and Columns*.

Select the Table view by clicking the Table tab in the Statistics view.



Select how the data should be calculated, for instance if the mean or maximum value should be shown under *Cell Values.*



Compare statistics for multiple media

Statistics for multiple media, for examples two images, can be compared by selecting multiple media in the media list.

An example on media to compare can be two different web sites where flight tickets are booked, or two similar advertisement images to select between. The images below are

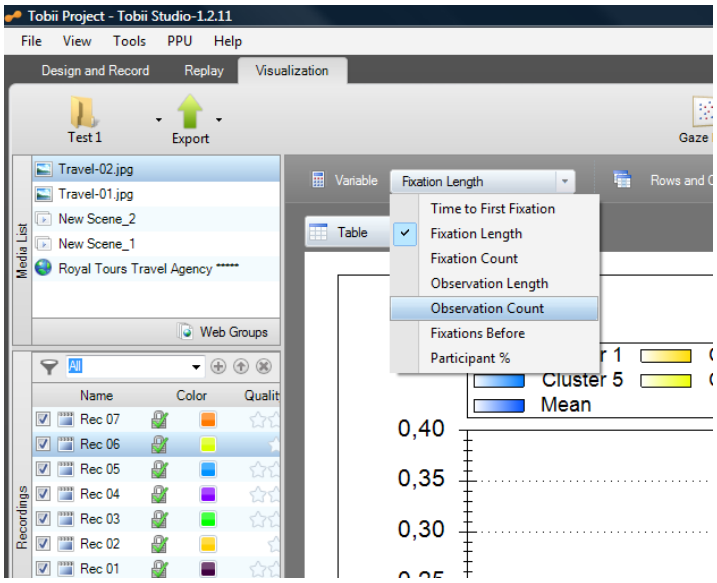
from the AOI tool and the statistics shown for multiple media further down is based on the following two images.

Several media is selected by holding done the *Ctrl* button and clicking all the media to include in the list. A chart or table for all selected media will be shown.

Under *Chart Settings* select to show both data and optional value, in the image the value mean is selected.

6.9.1 Variables

What to calculate and show data for in the chart is selected in the Variables drop down menu.

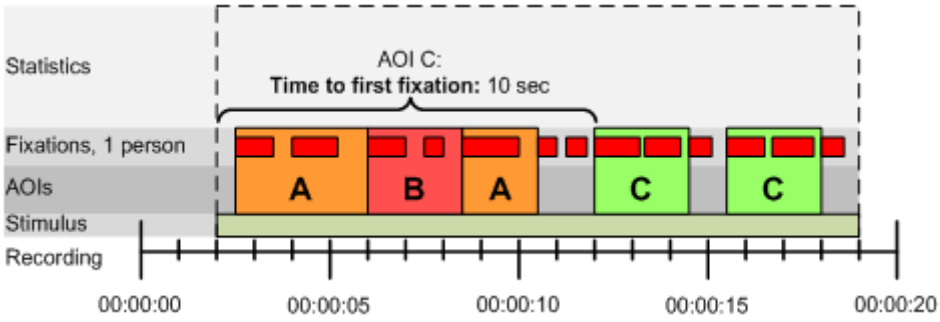


Time to first fixation

The time in seconds from when the stimulus was shown until the start of the first fixation within an AOI.

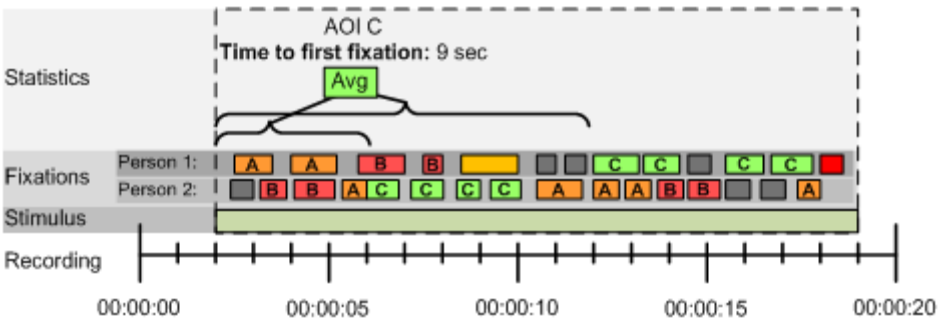
Recordings/Participants vs AOIs

The time to the first fixation for every AOI is displayed separately for every participant.



Images vs AOIs

The average time to first fixation over all participants is displayed for every AOI.



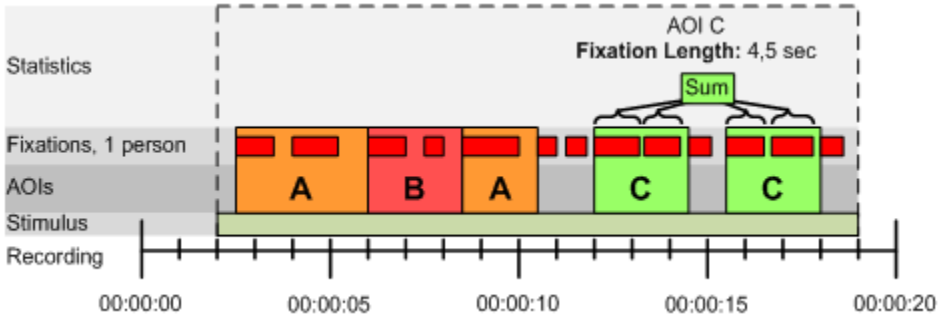
Fixation Length

The length of the fixations in seconds within an AOI.

This measure is based on the fixations as defined in the fixation filter found under the Fixation Filter in the settings menu.

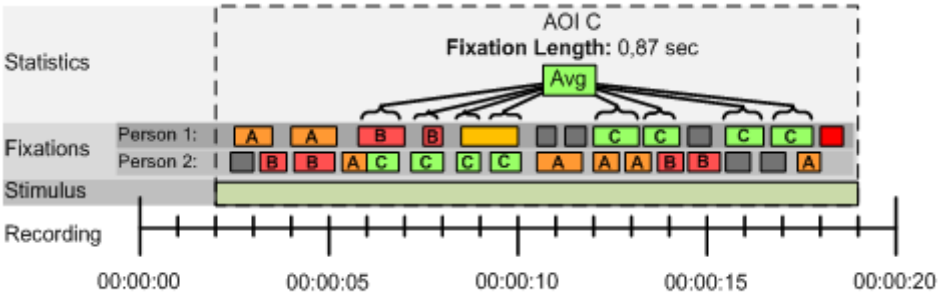
Recordings/Participants vs AOIs

The total length in seconds for all the fixations within and AOI is displayed separately for every participant.



Images vs AOIs

The average fixation length for all the fixations within an AOI is displayed for the respective AOIs.



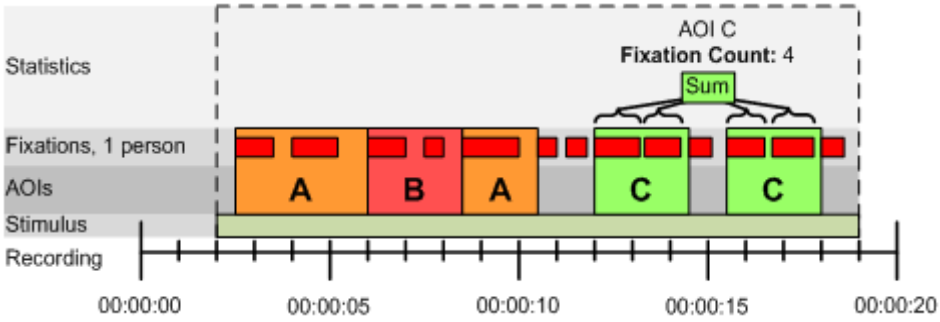
Fixation Count

The number of fixations within an AOI.

This measure is based on the fixations as defined in the fixation filter found under the Fixation Filter in the settings menu.

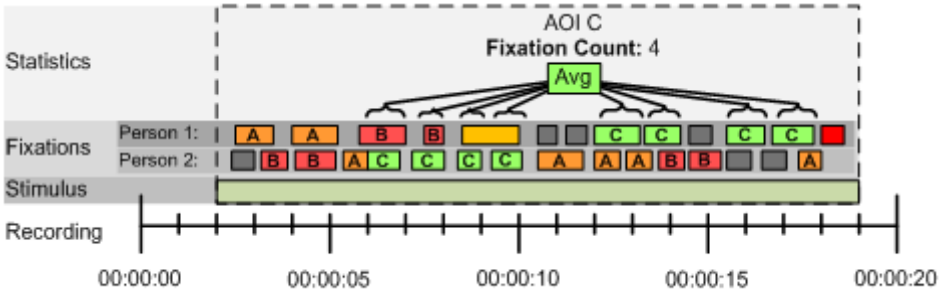
Recordings/Participants vs AOIs

The total number of fixations within an AOI is displayed separately for every participant.



Images vs AOIs

The average number of fixations within an AOI over all participants is displayed for the respective AOIs.



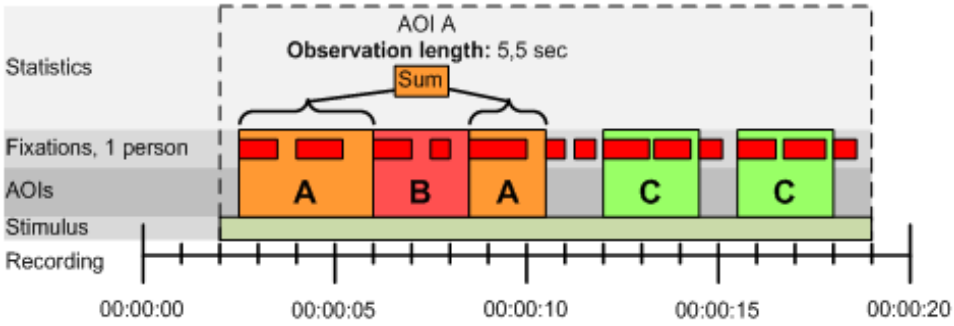
Observation Length

The total time in seconds for every time a person has looked within an AOI, starting with a fixation within the AOI and ending with a fixation outside the AOI. Note that there has to be a fixation within the AOI for it to be an observation.

This measure is based on the fixations as defined in the fixation filter found under the Fixation Filter in the settings menu.

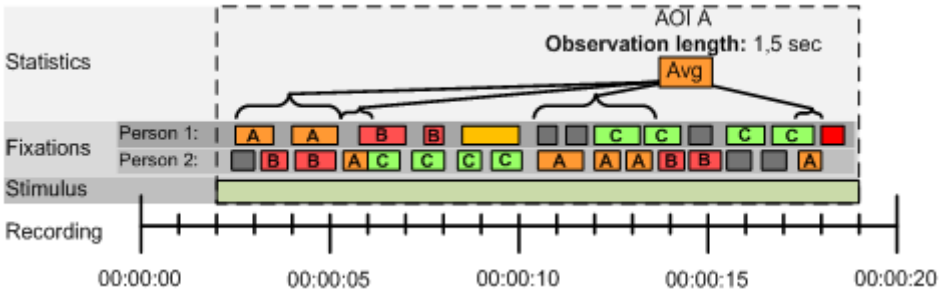
Recordings/Participants vs AOIs

The total length in seconds for every time a participant has looked within an AOI displayed separately for every participant.



Images vs AOIs

The average observation lengths for the different AOIs are displayed, including all participants.

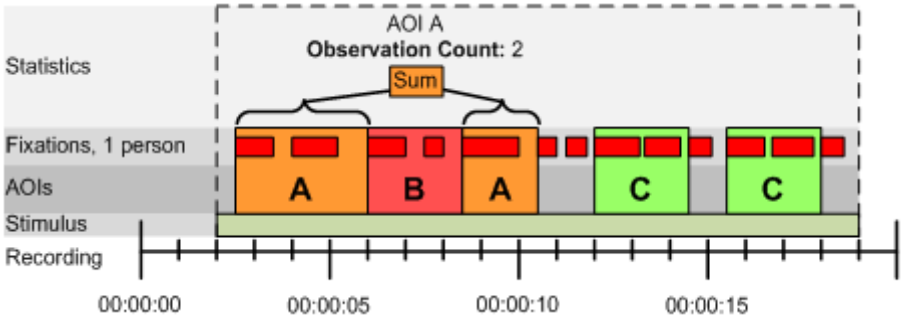


Observation Count

The number of visits to an AOI.

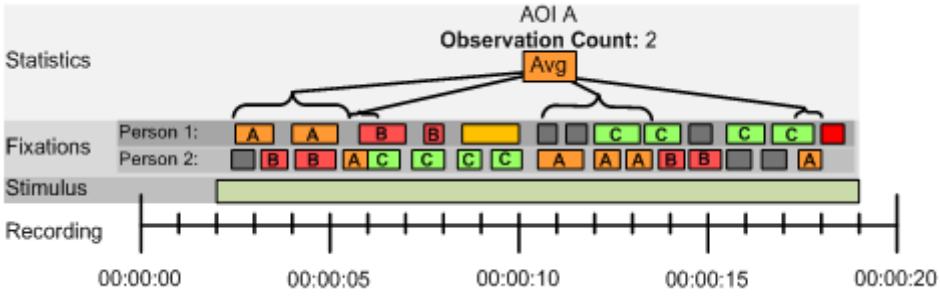
Recordings/Participants vs AOIs

The total number of visits and re-visits to an AOI is displayed for every participant separately.



Images vs AOIs

The average number of visits and re-visits to an AOI, including all participants, is displayed for the respective AOI.

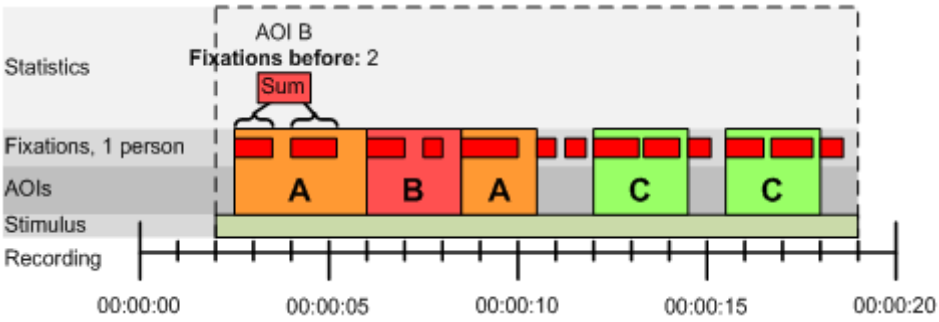


Fixations before

The number of fixations before the participant(s) fixated within an AOI for the first time.

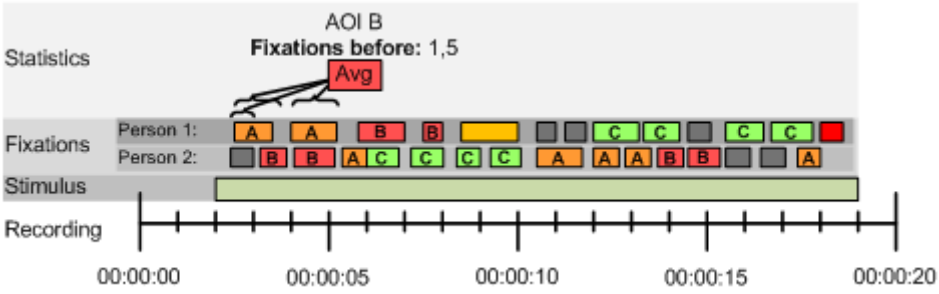
Recordings/Participants vs AOIs

The number of fixations before a participant fixated within an AOI for the first time is displayed for every participant separately.



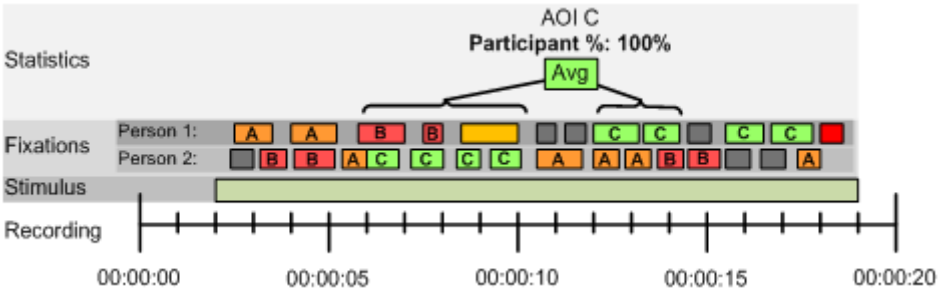
Images vs AOIs

The average number of fixations before the different participants fixated the first time within an AOI, displayed separately for every AOI.



Participant %

The percentage of participants that have fixated at least once within an AOI. Only available as a total for all participants (Images vs AOIs).

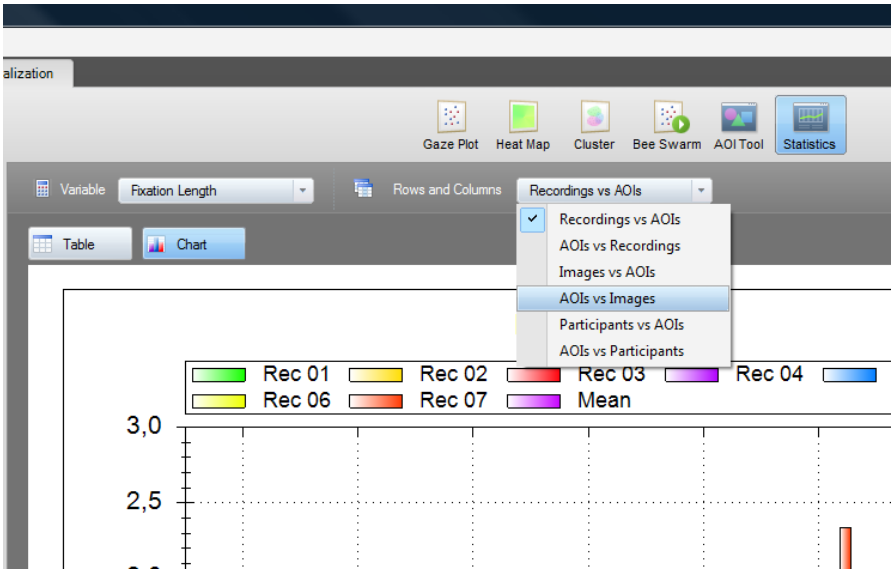


Rows and Columns

There are two different ways of presenting the statistical data for the different Areas of Interest (AOI); either as results for the different individual participants (recordings/participants vs AOIs) or as an average over all participants (Images vs AOIs).

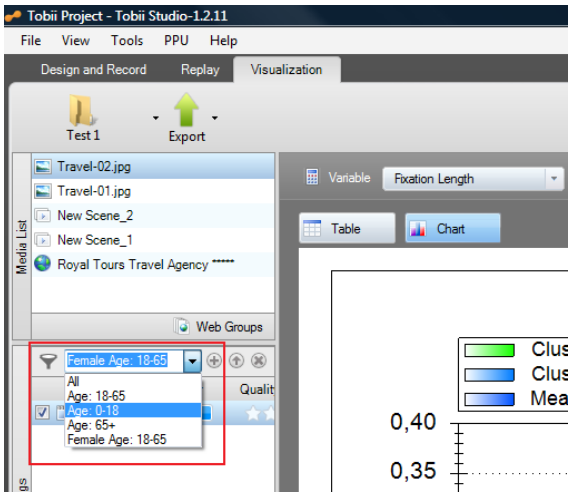
By using the *Cell Values* button in the Table view or the *Chart Settings* button in the Chart view it is possible to get other values such as averages for the different individuals.

To choose how the data is grouped and visualized go to the Rows and Columns drop down menu. The setting will change how the data is grouped in the table as well as in the chart.



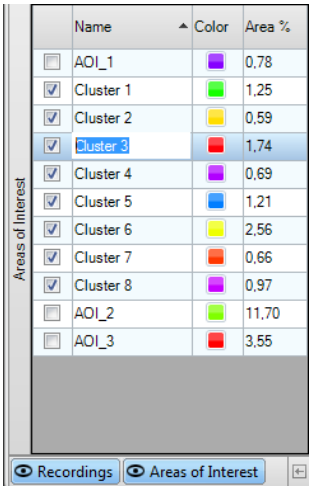
Data Filtering

By using a filter, recordings and data for, for example, males or teenagers can be filtered out. Select the default filter, All, to include all recordings. Read more about the filtering under Filters.



AOI information

The AOIs are listed next to the table or chart. To change the name of the AOI double-click on the name and type in the new name. Press enter when done. Select whether or not to include an AOI by using the check box in front of the AOI name.



Statistics and fixation filters

All the statistical data in Tobii Studio are affected by the fixation filters. By changing the settings for the fixation filters the results will vary as the idea with the fixation filters is to reduce the amount of data by combining individual fixations into groups of fixations and thus reduce the amount of data. In return, the duration of the fixations will be longer. The timeline in Visualizations also affects the results displayed as data and will only be available for the time interval selected.

7. Settings

7.1 Computer Settings

The first thing to do after installing the software (and eye tracking hardware) is to ensure that the computer settings are appropriate for running eye tracking tests.

7.1.1 Set Screen Resolution and Colors

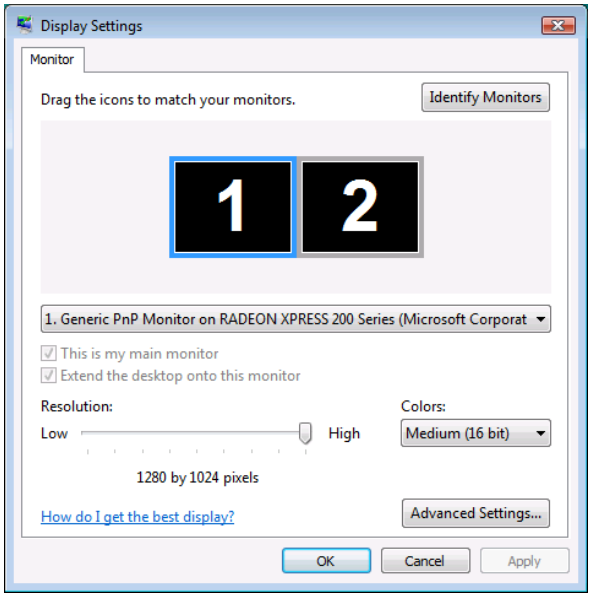
Tobii's recommendation is to always use the same resolution and color depth on the participant monitor, the eye tracker monitor, and the operator monitor.

1. Open the Start menu on your computer and select *Settings → Control Panel.*

2. Double-click on *Display* and click the *Settings* tab.

3. Make sure the *Screen resolution* is set to *1024x768* or *1280x1024*.

4. To lower performance and hard disk load, select *Medium (16 bit)* in *Color Quality*. For studies that require higher color quality, make sure to use a computer with high performance and contact support for recommendations.



7.1.2 Configure Monitor Setup (Local Live Viewer Setup)

This step is only required if you plan to use your system with an extra monitor to show the live viewer if both the eye tracker monitor and the live viewer monitor are both connected to the Tobii Studio™ computer.

In order to use double screens, your computer must be equipped with a dual-head graphics card and you must have two monitors connected to this card. One monitor is

the eye tracker monitor, where the stimuli is shown and one is a regular monitor for the Tobii Studio™ Live Viewer.

1. Once the graphics card is installed with the card-specific drivers, open the Start menu on your computer and select *Settings → Control Panel*.

2. Double-click on *Display* and click the *Settings* tab.

3. The eye tracker monitor should be the primary monitor and the control station monitor the secondary monitor. Click *Identify* to control which screen is the primary monitor. The screen where a *1* is shown is the primary screen.

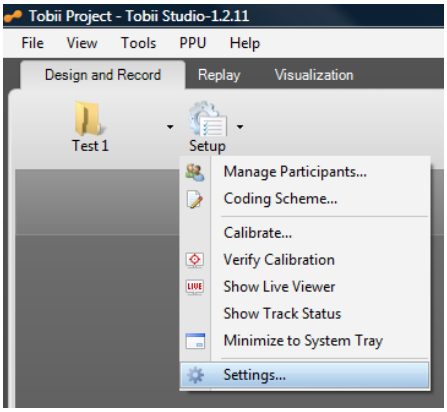
For some graphics cards you need to click *Advanced* on the *Settings* tab to access this function. If you are using the recommended ASUS graphics card, you must also click the tab, *Dual head.*

4. Click the representation of monitor 2 and check *Extend my Windows desktop onto this monitor* to extend the desktop onto the secondary display if no image is shown on the secondary screen.

5. Make sure the screens have a good resolution. Usually, the same resolution should be used on both screens. Recommended resolutions to use with Tobii Studio are 1024 x 768 or 1280x1024. If the higher resolution is used, make sure the computer has sufficient processing power to handle recordings with this resolution

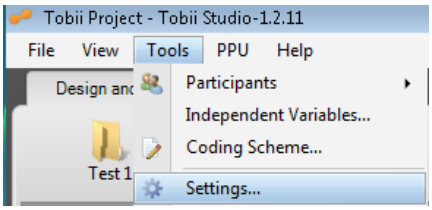
7.2 Tobii Studio Settings

The connection to the eye tracker, user camera settings, fixation filter and other study settings are handled from the Settings menu.



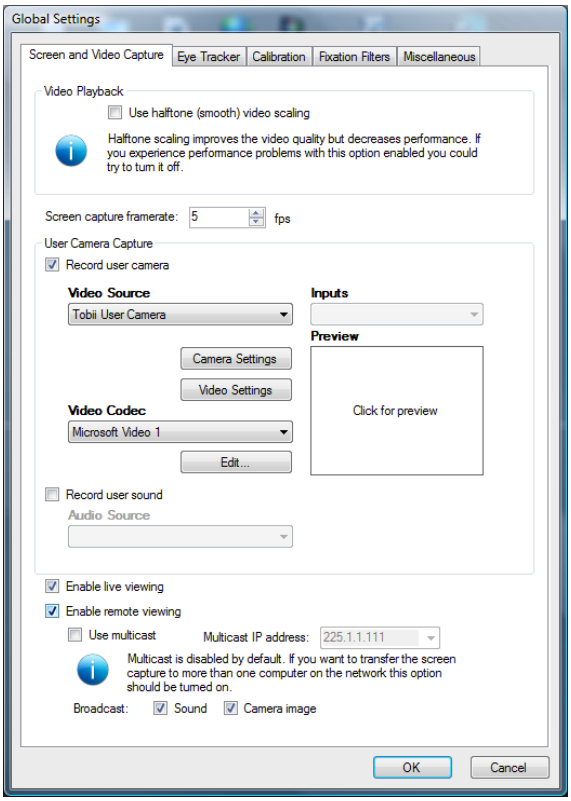
Under settings, the Tobii Studio software is connected to the eye tracker, which has to be done the first time the eye tracker is connected to the Tobii Studio computer or network as well as after each time it has been disconnected. The settings for the user camera, calibration and fixation filter are also found here. Read more under Settings.

The settings menu is found in the Design and Record view under Setup, and also in the Tools menu found at the top of each view.



7.2.1 Screen and Video Capture settings

Settings for the screen capture, user camera and user sound, as well as the remote viewer are found here. Go to the Settings menu and select the Screen and Video Capture tab.



Video Playback

Video smoothing is used to improve the video quality of playback of the recordings, such as the replay and live viewer video. If you experience performance problems disable the option.

Screen Capture

The sampling rate for the screen can be changed. For better quality, choose a higher frame rate. Note that a high frame rate will increase the data size and the load on the computer.

User camera and Video and Audio Settings

To save the images and sound from the user camera and user microphone check the alternatives, Save *User camera* and *User sound*. See image above.

If the alternatives are not checked, the user image and sound will not be available in replay or exported clips of the recording.

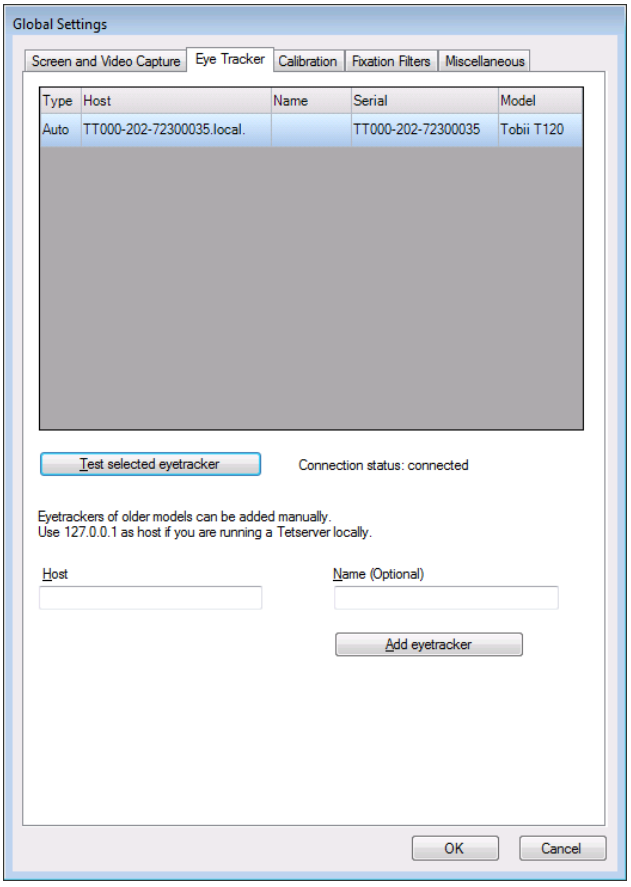
Select the source for the user camera and sound in the two drop down menus.

Different codecs can be used to save the audio and video. Codecs supported by and tested with Tobii Studio will appear in one column. To be sure you are using a codec that will work, choose one of these. Other codecs available on the computer will also be listed but only use this if you have a clear preference and carry out testing before using it for real studies. Note that Tobii can only guarantee that the codecs listed in the approved list will work on all computers. More codec recommendations can be found in the system recommendations.

7.2.2 Eye Tracker Connection

Connecting to the Eye Tracker from Tobii Studio

1. Select *Setup* → *Settings* and click the *Eye Tracker* tab.
2. Select the Tobii Eye Tracker to use from the list.



3. Click OK to connect. To make sure the connection works, press the *test selected eye tracker* button and make sure the status is, Connected.

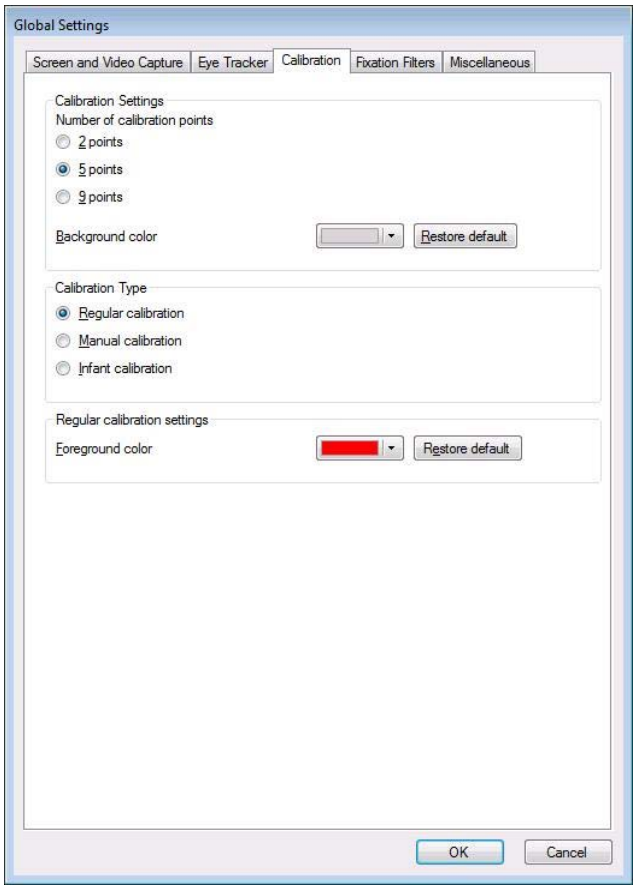
Connecting to an Eye Tracker from the 50 series

When using an X50, a 1750 or 2150 connected directly to the computer, enter local host (or 127.0.0.1). With this setup, a TET server has to be installed on the Tobii Studio computer.

7.2.3 Calibration

Settings

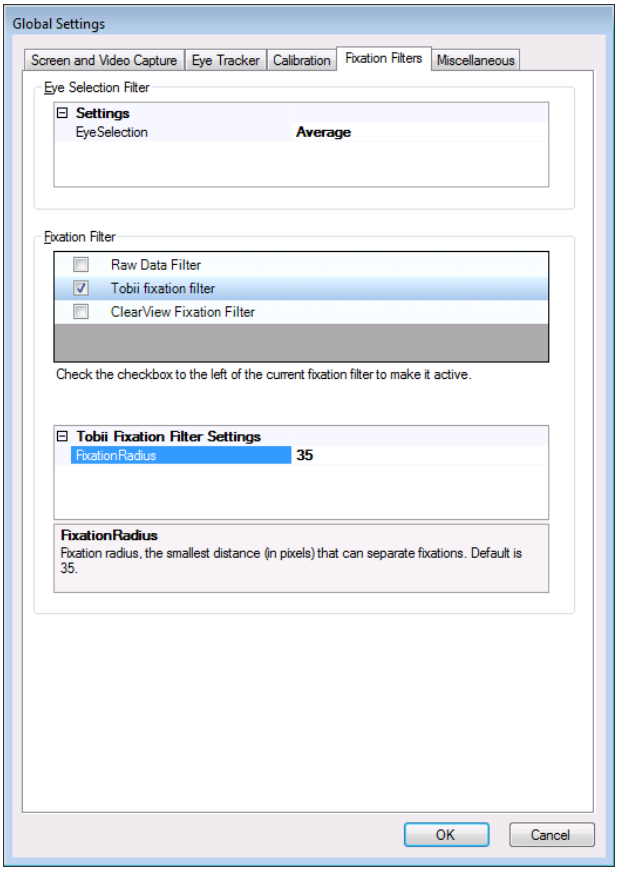
Colors and number of dots for the calibration can be changed. See image below. Read more under the chapter Calibration.



7.2.4 Fixation Filters

Fixation filters are used to group gaze data into meaningful fixations. Many different algorithms for fixation definition have been proposed and are available among researchers and practitioners. In part, the purpose of the study influences which types of fixation filters are most suitable.

The radius can be set for the fixation filters. Note that the radius is in pixels; real size in centimeters or inches has to be calculated. Also note that the radius has to be changed when the screen resolution is changed. The best option is to always use the same resolution in a single study.



There are different types of fixation filters available in Tobii Studio:

- Tobii fixation filter
- ClearView Fixation Filter
- Raw Data Filter

How the filters work and recommended filter settings are described per filter below.

Tobii Fixation Filter

The Tobii Fixation filter is used as the default filter.

Fixation filter definition

The filter detects quick changes in the gaze point signal using sliding averaging. How distinct the changes need to be in order to divide fixations can be adjusted with a threshold radius.

The filter estimates the position of the fixations between changes in gaze position by using a median-estimator and by checking if adjacent fixations (in the time-domain) are closer together than a given threshold (in the spatial domain). The threshold, h, is set under the fixation filter settings. The value is used when calculating whether the gaze point belongs to a new fixation or not; see step 3 below. The threshold value sets the maximum for how far apart fixations are allowed to be in pixel radius and still belong to the same fixation.

How the filter works

1. *Interpolation of missing data*
   Interpolation of samples is used when data samples are missing. This happens, for example, when a user blinks or looks away.
2. *Detecting saccades and fixations*
   Assuming the only eye motions present in the scan-path are fixations and saccades, we make the following distinction:
   a. If a segment of the signal is of constant or slowly changing mean value due to drift, we classify it as a fixation.
   b. If there is an abrupt change in the mean, we classify it as a saccade. By designing an algorithm that produces an alarm whenever it detects a change in the mean, we separate the saccades from the fixations. When this is done, we can estimate the spatial position of each individual fixation based on the information contained within its timeframe.
3. *Calculation of the difference vector*
   For each gaze point in the gaze data sequence, the difference between the *means* of the sample points within two sliding windows are compared:

$$\vec{m}_{before}(n) = \left[\frac{1}{r}\sum_{k=1}^{r} s_x(n-k), \frac{1}{r}\sum_{k=1}^{r} s_y(n-k)\right]$$

$$\vec{m}_{after}(n) = \left[\frac{1}{r}\sum_{k=1}^{r} s_x(n+k), \frac{1}{r}\sum_{k=1}^{r} s_y(n+k)\right]$$

$$d(n) = \sqrt{(\vec{m}_{after}(n) - \vec{m}_{before}(n)) \cdot (\vec{m}_{after}(n) - \vec{m}_{before}(n))^T}$$

   By comparing the difference between vector, *d,* with a threshold, *h*, this method produces an alarm when there is an abrupt change in the mean. The threshold, h, is set under the fixation filter settings. The averaging windows have to be made as long as possible in order to reduce the impact of noise. They also have to be limited not to span several saccadic motions within a single averaging window.
4. *Create list with peak incides*
   To find the saccades, all peaks in the d vector are identified. All peaks that are lower than a specified threshold are removed. One peak (saccade) per sliding window is allowed. If more than one peak is found within a span of 5 samples, the highest peak is kept as a saccade candidate and the lower peak is discarded.
5. *Estimate position of fixations*
   Estimates of the spatial position of the fixations between the candidate saccades

are calculated using the median of all samples in the interval. The indices of the candidate saccades (indices of remaining peaks) are here denoted k_i and estimates of spatial fixation positions are denoted f_k

$$f_k = median(s(i_k), s(i_k + 1), \ldots, s(i_{k+1} - 1), s(i_{k+1}))$$

ClearView Fixation Filter

Fixation filter definition

The settings for the ClearView fixation filter defines the maximum distance between two points for them to be considered as belonging to the same fixation and the minimum time for which gaze needs to be within the radius to be considered a fixation.

Recommended settings for different situations

Stimuli/Media with mostly pictures: Fixation radius 50 pixels and duration 200ms

Stimuli/Media with mostly reading: Fixation radius 20 pixels and duration 40ms

Stimuli/Media with mixed content: Fixation radius 30 pixels and duration 100ms

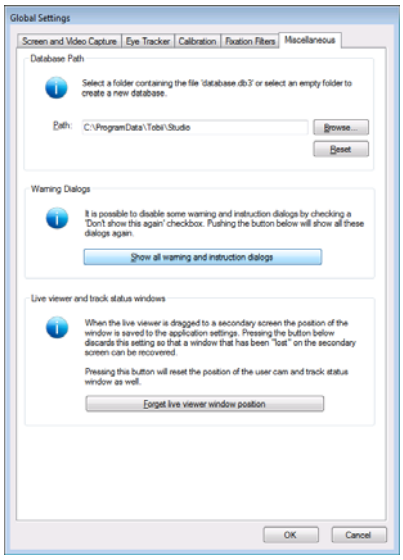
Raw Data Filter

No fixation filter is applied to the gaze data but all data points are displayed in the visualizations and used for analysis in the statistics tool. Note that this will require a lot of computer resources and the analysis will be very slow if a lot of data is recorded.

7.2.5 Miscellaneous

Database paths

The folder where the data is saved can be set under the Miscellaneous tab. Browse to find the folder where the data should be saved. Select a new folder to create a new database.


Global Settings
Screen and Video Capture
Eye Tracker
Calibration
Fixation Filters
Miscellaneous
Database Path
Select a folder containing the file 'database.db3' or select an empty folder to create a new database.
Path:
C:\ProgramData\Tobii\Studio
Browse...
Reset
Warning Dialogs
It is possible to disable some warning and instruction dialogs by checking a 'Don't show this again' checkbox. Pushing the button below will show all these dialogs again.
Show all warning and instruction dialogs
Live viewer and track status windows
When the live viewer is dragged to a secondary screen the position of the window is saved to the application settings. Pressing the button below discards this setting so that a window that has been "lost" on the secondary screen can be recovered.
Pressing this button will reset the position of the user cam and track status window as well.
Forget live viewer window position
OK
Cancel

Warning Dialogs

If warnings are disabled because the checkbox “Don’t show this again” has been checked and you want the warning to be shown again, press the button under the Warning Dialogs settings.

Live Viewer and track status windows

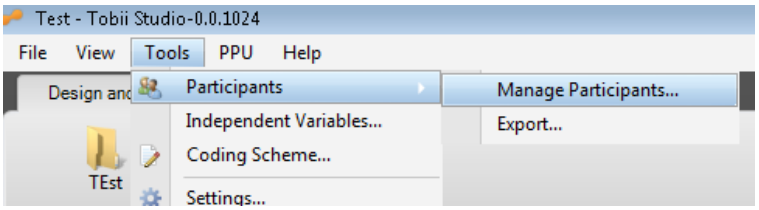
Tobii Studio will remember the position of the live viewer and the track status window when placed on the secondary screen and place it in the same position the next time it is started. To reset where the Live Viewer or track status is positioned press the button under the Live Viewer and track status window setting. This can be used if the track status is selected but is not visible because of the way it is placed on the secondary screen.

7.3 Participant Data

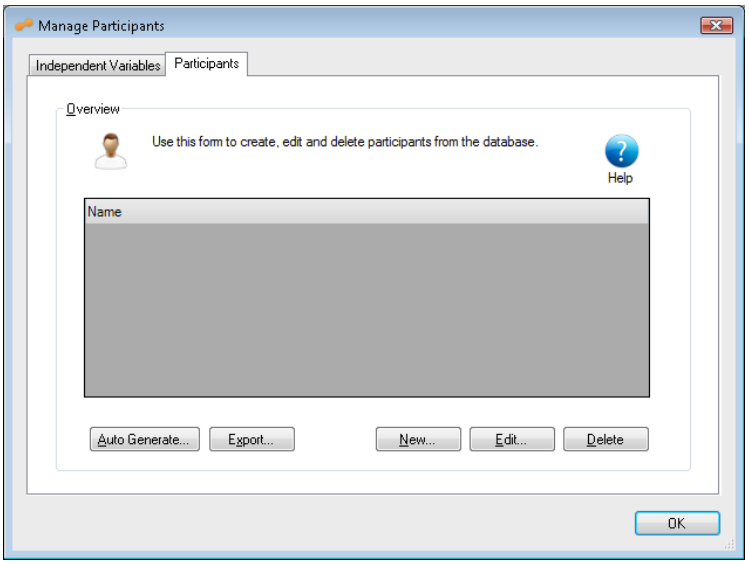
Participant data, names and different filtering variables such as gender and age can be entered and used to filter participant data in the visualizations and export.

Participant

Participants can be added and edited under Tools -> Participants -> Manage Participants

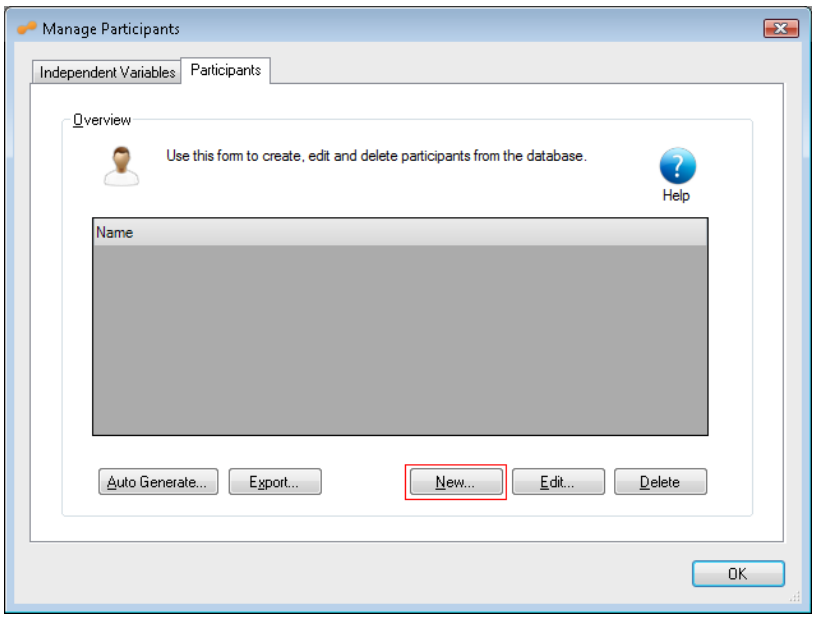


Select the *Participants* tab

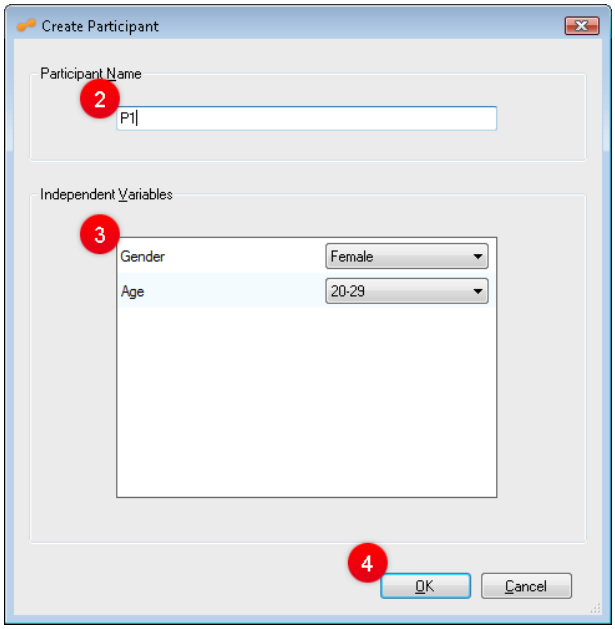


Add new participant

1. Select New under Participant

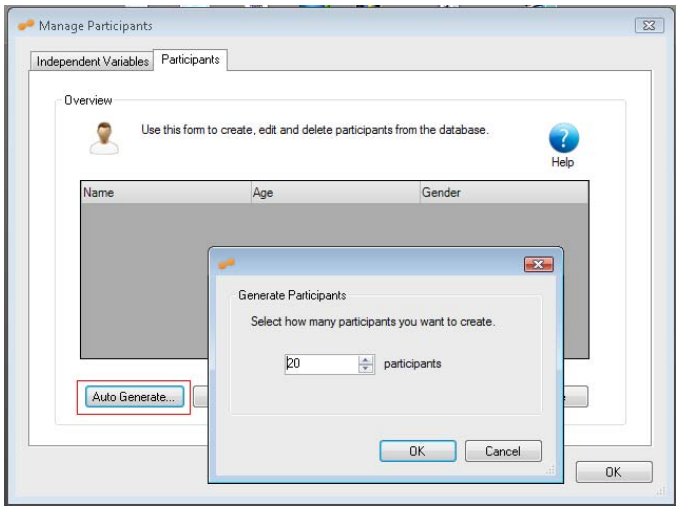


2. Enter a name for the participant, see image below.
3. Select variables for the participant if you want to use filtering in your analysis. For example, viewing a heat map for only the women participating. See image below.
4. Press OK



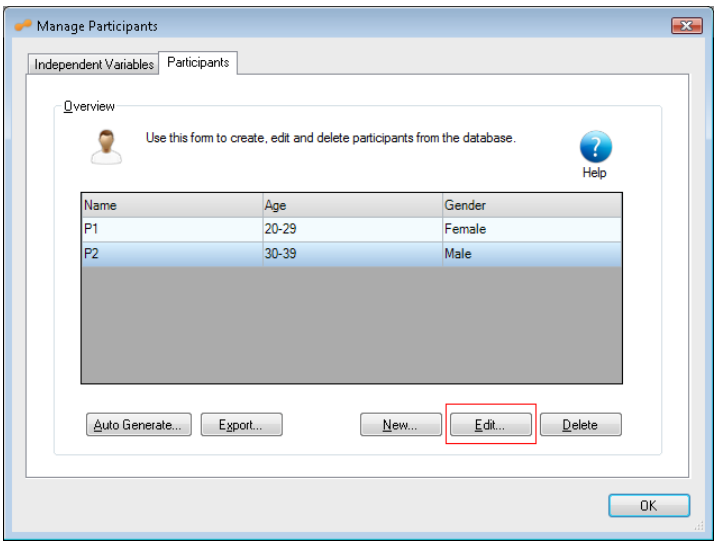
Auto generate participants

New participants can also be created by clicking the *Auto Generate...* button. An optional number of participants named P1 to Px are created, where x is the number of participants selected.



Edit existing participant

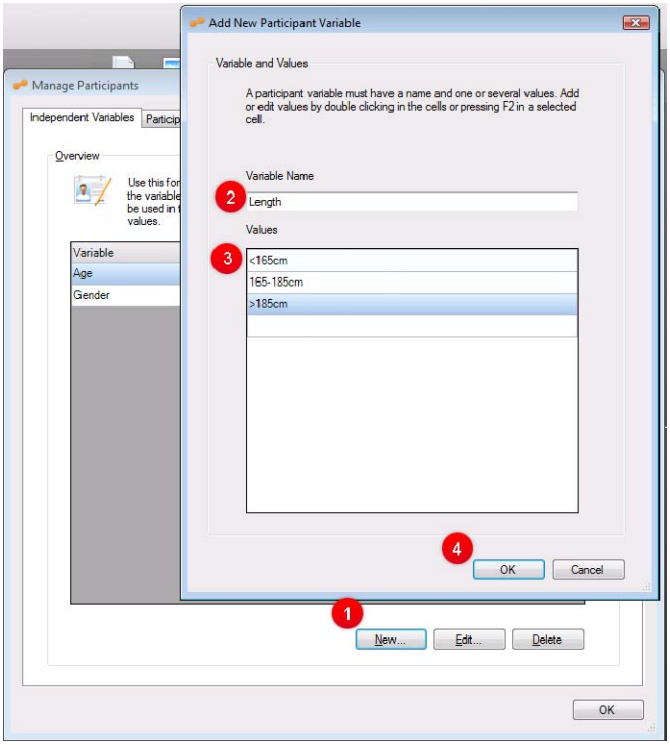
1. If a participant already exists, select participants from the list, see image below. Click Edit



2. Follow steps 2 to 4 under "Add new participant"

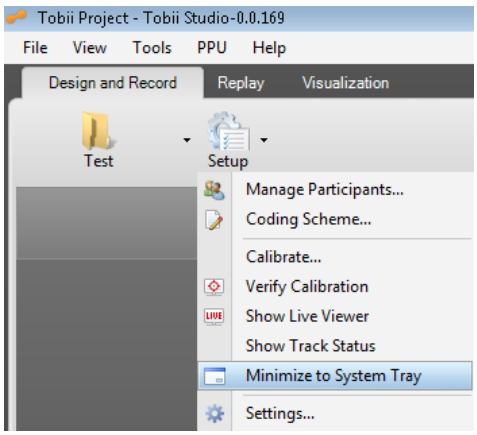
Independent Variables

1. Click New under Participant Data
2. Enter a name for the variable under Variable Name, e.g. gender, age or length
3. Enter value names in the box under Values, e.g. male and female, 21-30 years and 31-40 years or length as in the image below.
4. When done, press OK



7.4 Minimizing to system tray

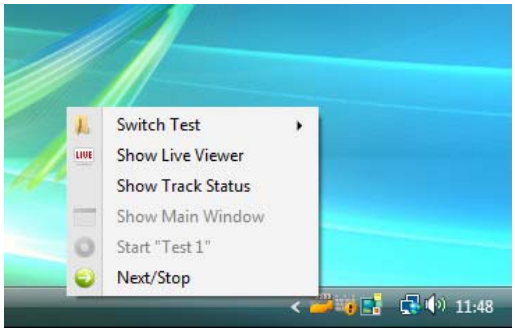
When selecting the option Minimizing to system tray in the Setup menu, the Tobii Studio window will be minimized.



An icon will be shown in the system tray instead, see image below. The system tray icon will also be visible during recordings. Right click on the Tobii Studio system tray icon to see the menu with the following options:

- Switch Test
- Show the Live Viewer
- Show the Track Status
- Show the Main Menu

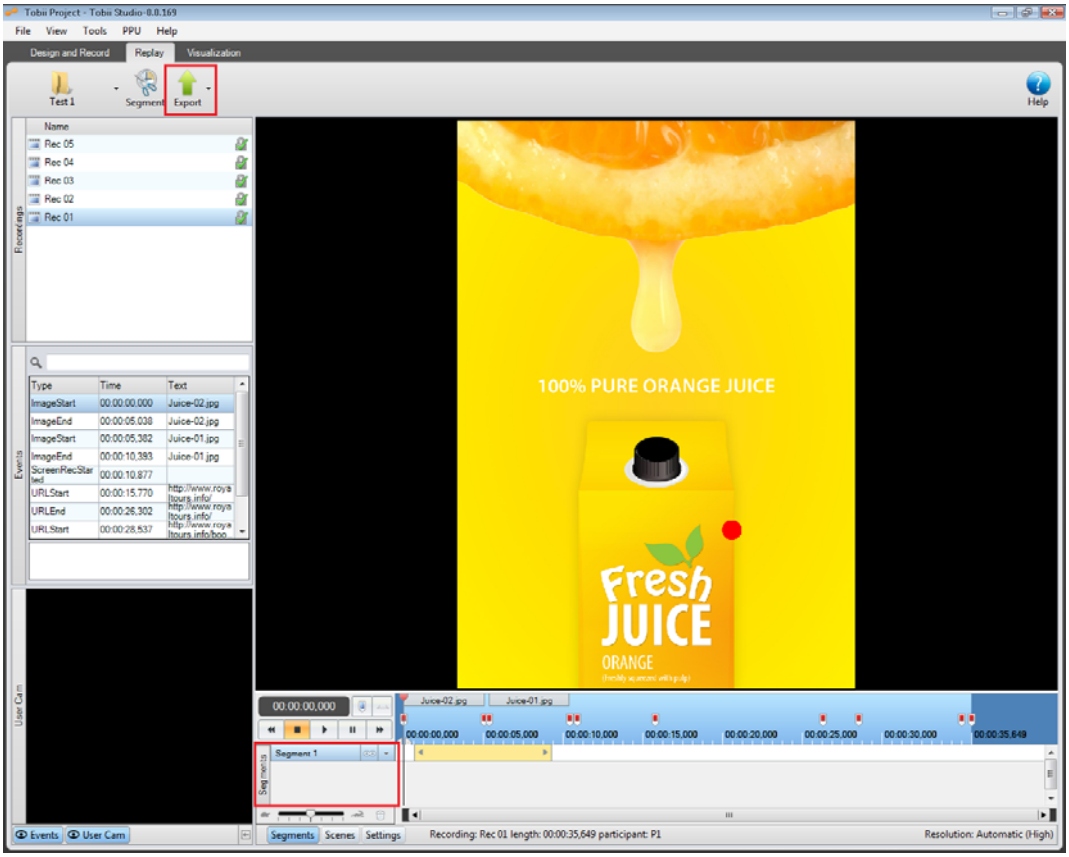
- Start and stop a Test



8. Export and Import

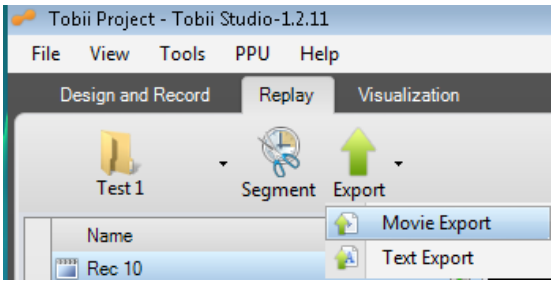
8.1 Export recording segments as movie

Segments can be exported one by one or in batches; several segments at once from the same or different recordings.



Single segments can be exported from the segment menu appearing when clicking the arrow on the segment.

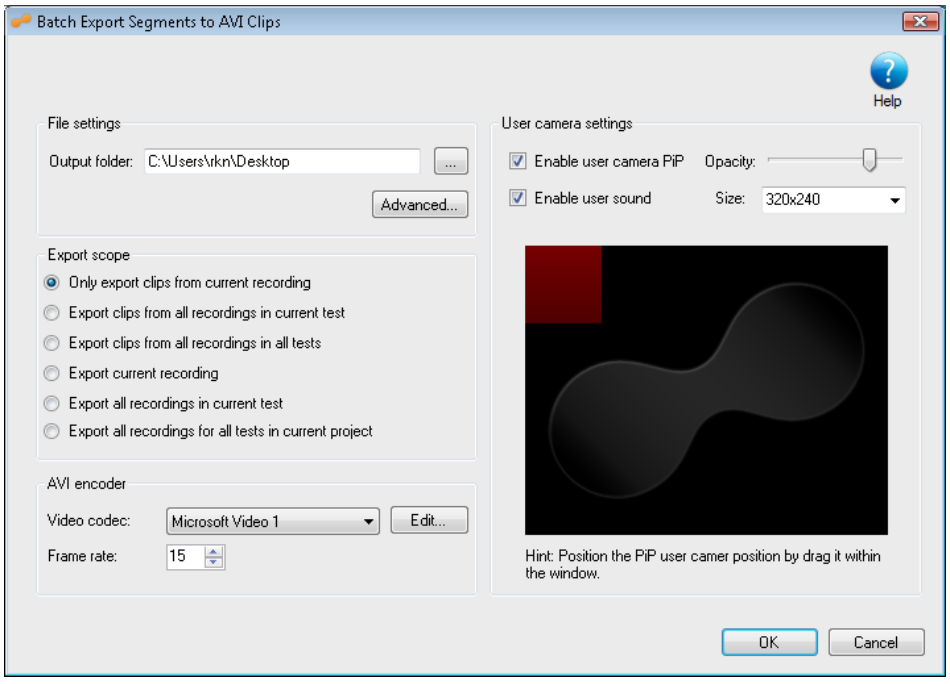
To export several segments at once click the Export button in the Replay view and select Movie Export.



Export Options

The export window that appears contains options for the export

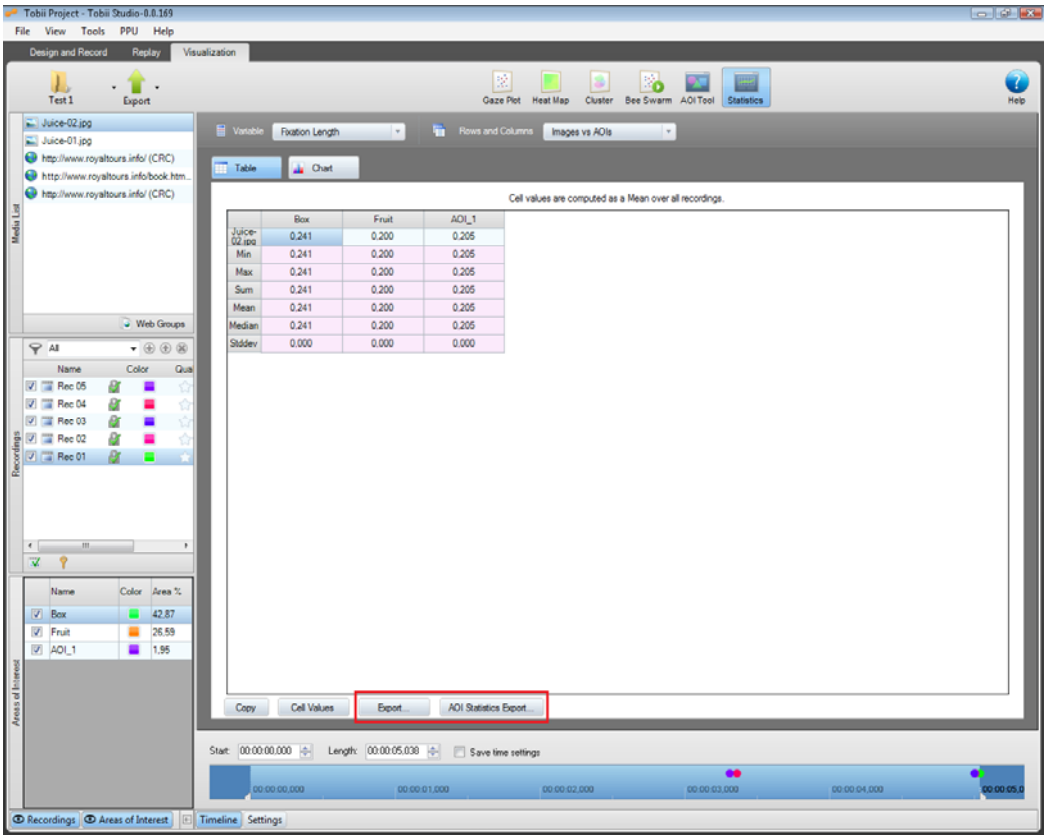
- *File Settings,* select the destination file and file name.
- *Export Scope,* select to export segments for one or several recordings.
- *AVI encoder***,** select the encoder for the movie segment. The standard encoders will be listed in the drop down menu. To select other encoders press the Edit button next to the Video codec drop down menu. Note that encoders other than the ones listed in the default drop down menu are not tested by Tobii and full compatibility cannot be guaranteed. Other recommended codecs are listed in our system recommendations.
- *User cam settings,* select if the user camera image should be shown in the exported movie. It is also possible to set where in the image the user camera should be placed as well as size and opacity.



8.2 Export data for statistical analysis

Statistics data can be exported from the statistics view in the Table view. To export all data, select the Export... button. For instance, the data can be analyzed in Excel. If exporting to SPSS or Matlab read more under Export to SPSS or Matlab.

It is also possible to export data in the table by right-clicking and selecting Copy. The data can be pasted in Excel, etc., for further analysis.



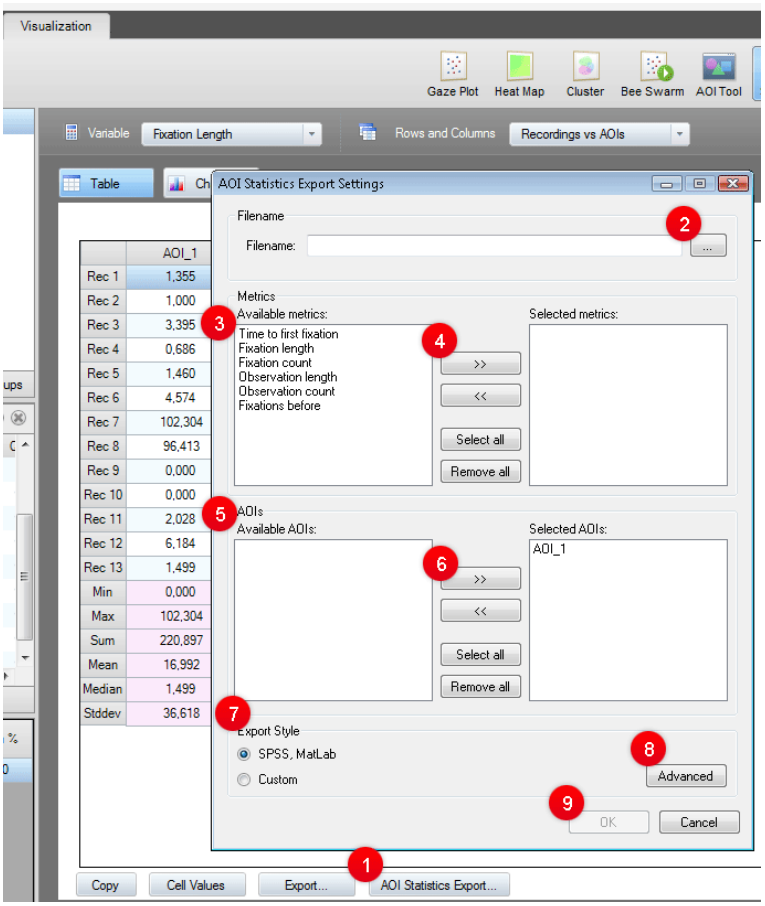
8.2.1 Export to SPSS or MatLab

Data can be exported to Excel, SPSS/MatLab with options to select different metrics to be included. To export to SPSS or Matlab click the *AOI statistics Export…* button in table view in statistics.

In the Settings window that appears, the metrics to include in the export can be selected as well as AOIs to be included.

1. To export in a format suitable for these applications go to the Table view under Statistics and select the *AOI Statistics Export...* button.
2. Start by selecting a filename and a folder to save the file by clicking the browse button.
3. Select Metrics by marking them.
4. Press the >> button. It is also possible to include all metrics by pressing *Select all.*
5. Select AOIs in the same manner
6. Press the >> to add the AOIs to the list

7. Select to export to SPSS/MatLab
8. To change the format of the exported data go to Advanced, more information found further down.
9. Press OK when done



Advanced

Number Formatting

The Decimal separator to use in the exported files can be selected as well as the number of decimals to include.

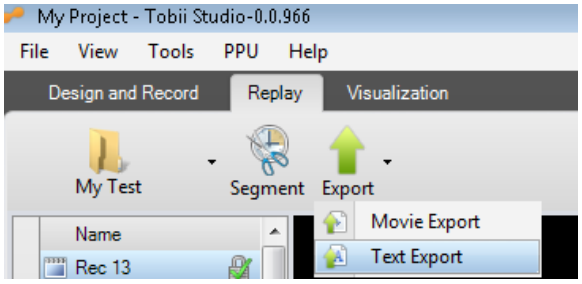
Row Labels

The row label can be either the Participant name or the Recording name. This will be the label shown in the export file and in SPSS or MatLab.

8.3 Text Export

The text export can be used to analyze data from Tobii Studio in other analysis or statistics software such as Excel, SPSS or Matlab. A text file with selected data is created and this file can be imported into the other software.

The text export is found in the Replay view under the Export button.



Output format

The output format of the text export is a tab separated text file. It can be opened using Excel, SPSS, Matlab or any text editor of your choice.

Selecting Data - Default view and Advanced view

The text export dialog has two tabs; Text export and Advanced. In the Text export tab, a couple of text export configurations are available to select from. In the Advanced tab, it is possible to define a custom text export configuration. Click on the links to the different options to learn more about how data can be selected.

Default view

Folder settings

This setting determines the folder that the export files will be placed in. The selected folder will be created automatically if it does not exist. A sub-folder per project, test and recording can be created. The name of the export file will be generated from the file name scheme in the export configuration. No files will be overwritten; if the specified file name exists a '_' will be appended to the file name.

Export scope

Current recording: exports the currently recording selected in the replay view.

Segments in current recording: creates one export file for each segment in the current recording.

All recordings in test: creates one export file for each recording of the currently selected test.
All segments from all recordings: creates one export file for each segment in all recordings.

Text export configuration table

Here, all saved configurations are shown. There are five default configurations. To create custom configurations go to the Advanced tab. When a configuration is selected it will set default selections in the advanced tab. By using the check boxes, multiple configurations can be selected for export.

Default configurations

- *All data*
  All possible text export data will be exported
- *Event data*
  User and system events will be exported
- *AOI data*
- Fixations on AOIs will be exported, one fixation on one AOI on each row in the text file
- *Fixation data*
  All fixations in the selected interval will be exported
- *Combined data*
  The combined data format introduced in ClearView, this contains the stimuli together with gaze data points mapped to the stimuli media

Exported Data - Definitions

To learn more about the data in the exported file see appendix II Text Export Columns.

Advanced view

In the Advanced Text Export tab it is possible to define a custom text export configuration.

Folder settings

This setting determines the folder that the export files will be placed in. The selected folder will be created automatically if it does not exist. A sub-folder per project, test and recording can be created. The name of the export file will be generated from the file name scheme in the export configuration. No files will be overwritten; if the specified file name exists a '_' will be appended to the file name.

File settings

A custom file name scheme can be specified. There are three tags that can be used in the scheme, when the file name is generated these tags will be replaced as explained below:

[TN]: replaced with the name of the current test

[RN]: replaced with the name of the current recording

[SN]: replaced with the name of the current segment. If the current element is not a segment, this part will be excluded from the file name.

[TM]: time when the export file was created.

Export scope

- *Current recording*: exports the current selected recording in the replay view.
- *Segments in current recording:* creates one export file for each segment in the current recording.

- *All recordings in test: create*s one export file for each recording of the currently selected test.
- *All segments from all recordin*gs: creates one export file for each segment in all recordings.

Header, gaze, events and scenes

- *Write header*: includes a header with information about the recording, recorder system, and participant in the export file
- *ClearView compatible*: write the header in a format similar to the header format used in ClearView
- *Write column header*: write the data/column description per column on one row before data is listed
- *Write filter header*: write eye and fixations filter information in the header
- *Export gaze data*: export gaze point data, one row for each item
- *Only fixations*: only write one row for each fixation, do not write one row for each raw data sample
- *Print AOIs on separate rows*: create one row for each fixation on each AOI
- *Export event*: include events in the export file
- *Exclude scenes*: do not include scenes in the text export file. This is often an option you want to leave turned on. If scenes are not excluded, fixations will be mapped to scenes instead of the underlying media.

Save text export configuration

Enter a new name for the configuration; this name will appear in the list view in the Text export tab.

Columns

Columns can be selected manually in the advanced view. It is also possible to pre-select data in the default text export view. Configurations selected in the text export configuration table will set default selections in the advanced tab.

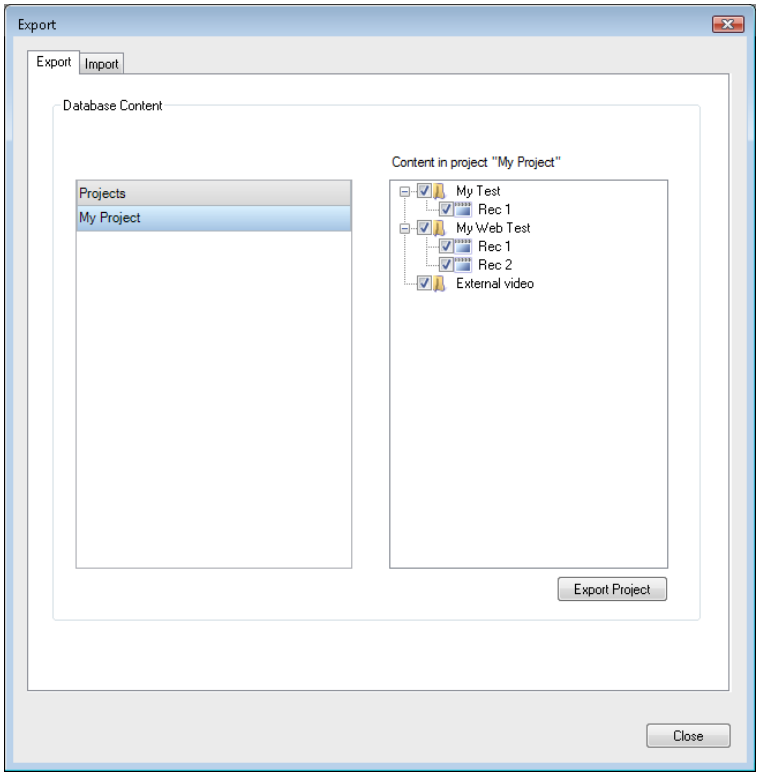
The data in the text export that can be selected under, Columns, is further explained under Text Export Columns in appendix II.

8.4 Import, export and merge tests and projects

Export and Import of a whole study or tests can be done either in the start up of Tobii Studio or by going to *File -> Export and Import* in Tobii Studio.

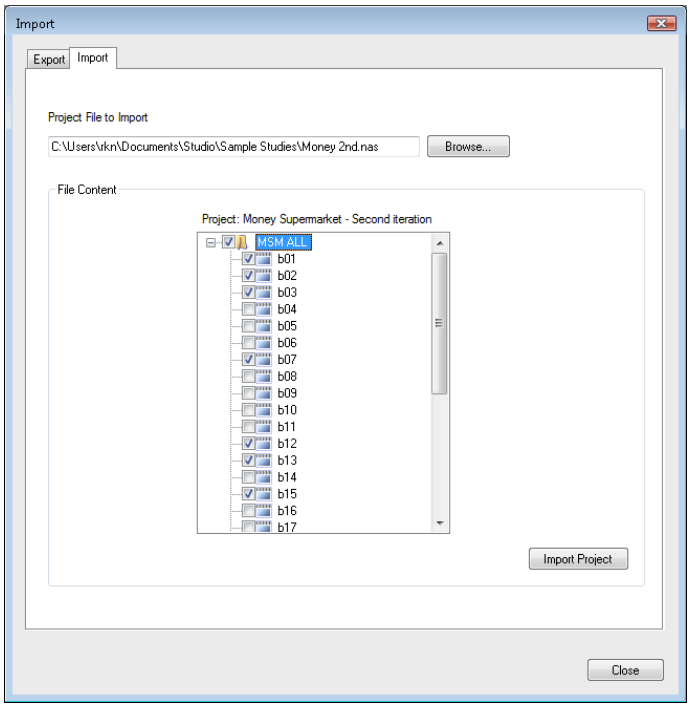
8.4.1 Export

Which tests and recordings to include in the export can be selected in the export view by checking the boxes next to the tests and recordings to include. When done, press *Export Project*.



8.4.2 Import

Browse to find the Studio file to import. It has to be a file exported from Studio with the file extension .nas, for example *myproject.nas*. As for the export, it is possible to select to import only parts of the project by checking the tests and recordings to include in the import. Press *Import Project* when ready.



8.4.3 Merge

Recordings and tests in a project can be merged if the project is created on one computer and thereafter is exported and recordings are made on different computers.

It is not possible to merge projects created on different computers in Tobii Studio.

To merge recordings from different computers into one test or project follow the steps below:

1. Create a study in Tobii Studio on one computer
2. Export the study by going to File, Export and Import.
3. Import the study to one or several other computers
4. Run the study (record) on the different computers. Make sure to use different names for the recordings on the different computers to be able to differentiate between recordings once the studies are merged. Do not change the name of the study or test.
5. Export the study from all computers except the one where the analysis is to take place.
6. Import the study from the other computers to the analysis computer. This is done in Tobii Studio under File, Export and Import.
7. All recordings from all computers will now be shown in the same study on the analysis computer.

9. Installation

9.1 Installation instructions

1. Microsoft .NET framework must be installed on the target computer. If not installed; install from the folder on the installation CD.

2. DirectX 9 must be installed on the target computer. This is usually the case with new computers. To check the DirectX version on your computer, run the dxdiag utility. Dxdiag can be started by going to the start menu, selecting run and typing “dxdiag” (Windows XP) or typing the same thing into the search field (Windows Vista). The current DirectX version can be found in the System tab in dxdiag. If needed, the latest DirectX run-time can be downloaded from the Microsoft Download center http://www.microsoft.com/Downloads/Search.aspx

3. Run “Studio-x.msi”

4. If the hardware is an eye tracker from the 50-series (1750, x50, 2150) the TET Server has to be installed. Go to the TET Server Installation Files folder and Run "TETServer 2.9.16.msi".

System recommendations

System recommendations is a separate document, which can be downloaded from www.tobii.com and be obtained from Tobii sales and support.

9.2 License

A license key is needed to run Tobii Studio. The license can be found on the Tobii Studio CD cover. It can also be obtained from Tobii by contacting support.

10. Appendix

Appendix I - Event Data

The table below shows the Events and Event Data that can be found in the text export and the event list in the Replay view.

Event	Event Key	Data 1	Data 2	Descriptor
ImageStart	8			Image Name
ImageEnd	16			Image Name
InstructionStart	2048			
InstructionEnd	4096			
MovieStart	128			Movie Name
MovieEnd	256			Movie Name
ScreenRecStarted	8192			
ScreenRecStopped	16384			
URLStart	512			URL/website name
URLEnd	1024			URL/website name
KeyPress	4	ASCII code for key pressed		Key name
LeftMouseClick	1	X mouse coordinate	Y mouse coordinate	
RightMouseClick	2	X mouse coordinate	Y mouse coordinate	
LogData	0	Log name	Logging comment	

Appendix II – Text Export Columns - Data Definition

Timestamp

The timestamp in milliseconds for when the gaze data was collected

DateTimeStamp

The timestamp recalculated and shown in minutes, seconds and milliseconds (mm:ss:ms)

DateTimeStampStartOffset

The time for the timestamp in hh:mm:ss. The start time for the recording is also shown in the Replay and Visualization views in Tobii Studio if the option Show Date is selected in the Recordings field. The start time is taken from the computer time

Number

The timestamps in numbered order

Gaze PointXLeft

The horizontal screen position of the gaze point for the left eye

GazePointYLeft

The vertical screen position of the gaze point for the left eye

CamXLeft

The horizontal location of the left pupil in the camera image (0 is left edge, 1 is right edge)

CamYLeft

The vertical location of the left pupil in the camera image (0 is top, 1 is bottom)

DistanceLeft

Distance from the eye tracker to the left eye. The distance is given in mm on a straight axis right out from the eye tracker plane

PupilLeft

The size of the pupil (left eye) in mm. The distance and pupil size measures are calculated to be as close to real values as possible. However, individual differences in the eyes of subjects and the strength of glasses/contact lenses will cause errors in these values. However the measures still reflect *changes* in head position and pupil size accurately

ValidityLeft

The validityof the gaze data. The validity is 0 if the eye is found and the tracking quality good. If the eye cannot be found by the eye tracker the validity code will be 4. Read more under the Validity codes section further down

Gaze PointXRight

The horizontal screen position of the gaze point for the right eye

GazePointYRight

The vertical screen position of the gaze point for the right eye

CamXRight

The horizontal location of the right pupil in the camera image (0 is left edge, 1 is right edge)

CamYRight

The vertical location of the right pupil in the camera image (0 is top, 1 is bottom)

DistanceRight

Distance from the eye tracker to the right eye. The distance is given in mm on a straight axis right out from the eye tracker plane

PupilRight

The size of the pupil (right eye) in mm. The distance and pupil size measures are calculated to be as close to real values as possible. However, individual differences in the eyes of subjects and the strength of glasses/contact lenses will cause errors in these values. However, the measures still reflect *changes* in head position and pupil size accurately

ValidityRight

The validity of the gaze data. The validity is 0 if the eye is found and the tracking quality good. If the eye cannot be found by the eye tracker the validity code will be 4. The value is for the right eye. Read more under the Validity codes section further down

FixationIndex

The indexes for the fixation points

GazePointX

The Gaze PointX can be the horizontal screen position for either eye or the average for both eyes. The value to show here is specified in Tobii Studio under Tools -> Settings -> Fixation Filters -> Eye Selection Filter. This value is also used for the fixation definition

GazePointY

The Gaze PointX can be the horizontal screen position for either eye or the average for both eyes. The value to show here is specified in Tobii Studio under Tools -> Settings -> Fixation Filters -> Eye Selection Filter. This value is also used for the fixation definition

Event

Events, automatic and logged, will show up under Events. The automatic events are start and end events for the different media, mouse clicks and key presses. The automatic events are listed in the event table under Event Key and Data. The logged events are the manually logged events entered either in the replay view or from the remote logger

EventKey

A unique event key is shown for different key presses. The different event keys with corresponding events, data and descriptions are listed under Event Key and Data.

Data1

A data field for the event. The contents of this field vary depending on what type of event this is. See the Event key table below

Data2

A data field for the event. The contents of this field vary depending on what type of event this is. See the Event key table below

Descriptor

A description of the event. The contents vary depending on what type of event this is. See the Event key table further down

StimuliName

The file name of the media given in the setup in Tobii Studio

MediaWidth

Media size in pixels

MediaHeight

Media size in pixels

MediaPosX

The distance from the left side of the screen to the media on the screen given in pixels

MediaPosY

The distance from the top of the screen to the media on the screen given in pixels

MappedFixationPointX

The x coordinate for the fixation point mapped to the media coordinate system, where the origin for the coordinate system is the top left corner of the image/media

MappedFixationPointY

The y coordinate for the fixation point mapped to the media coordinate system, where the origin for the coordinate system is the top left corner of the image/media

FixationDuration

Fixation duration. The time in milliseconds that a fixation lasts

AoiIds

ID number for the AOI, usually a counter starting at zero for the first AOI

AoiNames

The name of the AOI or AOIs if fixations on multiple AOIs are to be written on the same row

WebGroupImage

Filename of the image file that is used to visualize the web group

MappedGazeDataPointX

The x coordinate for the raw gaze data point mapped to the media coordinate system where the origin for the coordinate system is the top left corner of the image/media

MappedGazeDataPointY

The y coordinate for the raw gaze data point mapped to the media coordinate system where the origin for the coordinate system is the top left corner of the image/media

MicroSecondTimestamp

Timestamp for this export row in microseconds

Validity Codes

The validity code ranges from 0 to 4, with the following interpretations for each value:

0 The system is certain that it has recorded all relevant data for the particular eye and that the data recorded belongs to the particular eye (no risk of confusing left eye with right eye by the system).

1 The system has only recorded one eye, and has made some assumptions and estimations regarding if the recorded eye is left or right. However, it is still highly probable that the estimations made are correct. The validity code on the other eye is in this case always set to 3.

2 The system has only recorded one eye and has no way of determining if this is the left or the right eye.

3 The system is fairly confident that the actual gaze data is actually incorrect or corrupted. The other eye will always have validity code 1.

4 The actual gaze data is missing or definitely incorrect. A couple of gaze data with validity code 4 on both eyes, followed by a number of gaze data with validity code 0 on both eyes, are usually a sure sign of a blink.

It is recommended that the validity codes always be used for data filtering to remove data points, which are obviously incorrect. For most studies, we recommend removing all data points with a validity code of 2 or higher.

Tobii Technology AB

Karlsrovägen 2D
182 53 Danderyd
Sweden
PHONE +46 8 663 69 90
FAX +46 8 30 14 00
E-MAIL sales@tobii.com

Tobii Technology GmbH

Niedenau 45
60325 Frankfurt am Main
Germany
PHONE +49 69 24 75 03 40
FAX +49 69 24 75 03 429
E-MAIL sales.de@tobii.com

Tobii Technology Japan, Ltd

3-4-13 Takanawa, Minato-ku,
Tokyo 108-0074
Japan
PHONE +81-3-5793-3316
FAX +81-3-5793-3317
E-MAIL sales.jp@tobii.com

Tobii Technology Inc.

510 N, Washington St, Suite 200
Falls Church, VA 22046
USA
PHONE +1 703 738 1300
PHONE +1 888 898 6244
FAX +1 703 738 1313
E-MAIL sales.us@tobii.com

www.tobii.com